MODERN MECHANIX AND INVENTIONS

OCT.

NOW 15¢

IN CANADA 20¢

For Explanation This Drawing SEE PAGE 62

THE AUTOMOBILE OF THE FUTURE

EDISON'S SECRET SPIRIT EXPERIMENTS

Another PYROIL Victory

See the

PYROIL EXHIBIT

at the **World's Fair**
(General Exhibits Building)

Louis Meyer's Pyroil Treated Car Breaks World's Record at 104.162 Miles Per Hour!

Western Union Telegram, Indianapolis, U. S. A., May 31, 1933:
Pyroil Co., LaCrosse, Wisc.,
"Won 500 mile race breaking all records using Pyroil." (Signed)
Louis Meyer.

Pyroil accomplished one of the most spectacular feats in all history when it proved its almost unbelievable efficiency before thousands of spectators at the recent Indianapolis 500-mile race, and dumbfounded drivers, mechanics and race officials. Read the authentic testimony at the right.

Leon Duray, internationally famous driver, and owner of the 2nd winning car, used Pyroil Company: "I want to congratulate Pyroil for what I know to be one of the greatest performances ever made stop My car finished the 500 mile race running at least 50 miles without oil which fact was proven after race by AAA technical representative who could not get over two ounces of oil from my tank." (Signed) Leon Duray, Owner Car No. 17 Mallory Special.

Of 11 cars to finish this race, 5 were Pyroil treated! Joe Russo said: "Only reason why I was able to finish five hundred mile race on small allotment of oil allowed for the race was Pyroil." (Signed) Joe Russo, Chief Engineer, Henry and Russo Engineering Co.

There was never a greater opportunity than right now for you to cash in on the sales opportunities offered by Pyroil. Start at once—in a small way or big. Demand created by constant program of international advertising (See Saturday Evening Post, Aug. 19, 1933; Time, August 21, 1933; Maclean's (Canada), Aug. 15, 1933). Full promotional facilities. Sell filling stations, garages, dealers, also direct to consumer.

Pyroil saves motors, frees valves, stops ring-seal, greatly increases power, affords economical operation, saves many times its small cost.

PYROIL WINS 1st 2nd 5th at INDIANAPOLIS SPEEDWAY CLASSIC – 1933

Wilbur Shaw, 2nd, Drives His Pyroil Treated Car Last 20 Laps—50 Miles—With No Oil in Crankcase! The Most Amazing Performance Ever Accomplished.

Western Union Telegram, Indianapolis, U. S. A., June 1, 1933.
"Cannot give Pyroil credit due it for it certainly enabled me to finish the 500 mile race here without any oil pressure stop With 52 laps to go or 130 miles my oil pressure dropped to zero and finishing the race in second place without oil I know I ran absolutely dry for 20 to 40 laps or 50 to 100 miles dry at a speed of over 100 miles an hour stop on tearing down motor I found it in perfect condition thanks to the safety feature developed by Pyroil."
(Signed) Wilbur Shaw,
Driver Car No. 17, Mallory Special.

Western Union Telegram, Indianapolis, U. S. A., June 1, 1933:
Pyroil Company, LaCrosse, Wis.
"Use of Pyroil in my motor in the 500 mile race gave 200 to 300 more R P M as race progressed stop My compliments to Pyroil Company for such wonderful product from an added user and booster stop I finished fifth with motor performing better and better every lap and simply perfect during last hundred miles." (Signed) Stubby Stubblefield.

GENUINE PYROIL is patented in U. S. and Canada to W. V. Kibber, its inventor. Identified by copyrighted, lithographed cans and the winged Pyroil Trade-name (Registered U. S. and Canada) and the signature of W. V. Kibber on every label. Not sold under any other name.

Don't overlook the biggest opportunity of a lifetime. Mail the coupon at once. Manufactured, Patented, Guaranteed by Pyroil Company, W. V. Kibber, President, 6103 Pyroil Bldg., LaCrosse, Wis., U. S. A.

PYROIL COMPANY
6103 Pyroil Bldg.
LaCrosse, Wis., U. S. A.

Send full details of your Opportunity Offer at once. Also Trial Test Offer, and many amazing facts of Pyroil accomplishments. No obligation.

Name .....

Address .....

City .....

County ..... State .....

Genuine PYROIL LUBRICATING PROCESS

The 97-Pound Weakling...

who became "The World's Most Perfectly Developed Man"

"I'll Prove to You in 7 Days that YOU, too, Can be this NEW MAN!"

—CHARLES ATLAS

WHEN I say I can make you over into a man of giant power and energy, I know what I'm talking about. I've seen my new system of body development, *Dynamic-Tension*, transform hundreds of weaker, punier men than you into Atlas Champions.

Take myself, for instance. I used to weigh only 97 pounds! I was a sickly scare-crow. Then I discovered *Dynamic-Tension*. It gave me a body that twice won me the title "The World's Most Perfectly Developed Man." It can work just as big a change in you, too! I'm so sure of it that I make you this amazing offer: At my own risk I'll give you PROOF in just seven days that I can make you over into this NEW MAN. I'll begin training you *on approval*. If you don't notice a marvelous change in yourself *within a week* it won't cost you one cent.

No "if's," "ands," or "maybes." Just tell me where you want handsome, powerful muscles. Are you fat and flabby? Or skinny and gawky? Are you short-winded, pepless? Do you hold back and let others walk off with the prettiest girls, best jobs, etc.? Give me just 7 days! I'll PROVE to you that I can make you a healthy, confident, powerful HE-MAN.

Dynamic-Tension is an entirely NATURAL method. No mechanical weights or pulleys to strain your heart and other vital organs. No pills, special foods, or other unnatural, artificial contraptions. Only a few minutes of your spare time daily is enough to show amazing results—and it's actually fun! *Dynamic-Tension does the work.*

Send for FREE Book

Mail the coupon right now for full details and I'll send you my illustrated book, "Everlasting Health and Strength." Tells all about my "*Dynamic-Tension*" method. Shows actual photos of men I've made into Atlas Champions. Supplies the facts you need to know about *your* condition. It's a valuable book! And it's FREE. Send for your copy *today*. Mail the coupon to me personally. CHARLES ATLAS, Dept. 6-10, 133 East 23rd Street, New York City.

NOTE:
No other Physical Instructor in the World has ever DARED make such an Offer!

CHARLES ATLAS
Dept. 6-10
133 East 23rd Street, New York City

I want the proof that your system of "*Dynamic-Tension*" will make a New Man of me—give me a healthy, husky body and big muscular development. Send me your free book, "Everlasting Health and Strength." This request places me under no obligation.

Name .....
(Please print or write plainly)

Address .....

City ..... State.....

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Hotter than Coal
and no dirt

A New Invention

Do away *forever* with the drudgery of wood and coal. The most simple and economical invention on the market is now giving perfect satisfaction to enthusiastic users everywhere. This new invention is a new type of oil burner that takes the place of wood or coal and automatically and silently changes cheap oil into one of the quickest and hottest fires known.

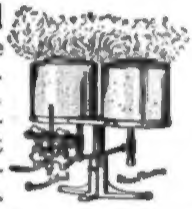
FITS ALL FURNACES

FITS ANY COOK-STOVE

FITS ANY HEATING-STOVE

Burns 96% Air and 4% Cheap Oil

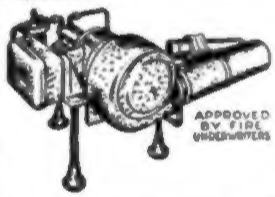
The International Oil Burner fits in the fire box of your present range, stove, or furnace. It can be installed in a few minutes by anyone. There is nothing complicated about the International Oil Burner. It gives you all the heat you want—when you want it. Starts instantly with a match. No soot, smoke, or odor. Costs less than coal.



Double Blue Flame Burner for cook stoves, ranges, and parlor circulators. Burns with beautiful clean blue flame.

Costs Only a Few Dollars

International Oil Burners heat just as well as burners costing $400 or $500. Simply turn 1 valve and you have all the heat you want. Cleaner and better for heating or cooking. Approved by the National Underwriters' Laboratories and engineers everywhere. Over 150,000 have been sold.



All-Electric Power Burner designed for larger houses, apartments, etc.

30 Days' TRIAL OFFER

Try this wonderful automatic oil burner right in your own home at our risk. Act quickly and get our special low introductory price. Sold under absolute money-back guarantee. Write at once for free booklet on home heating and how to get a burner without cost.

The burner advertised over world's largest radio stations.

Sold on Money Back Guarantee — in fact — Guaranteed for TEN YEARS

Agents—Dealers—Distributors

Big money to be made. Demand is enormous. Claude Wintz sold $4301.00 in one month. We want spare or full time workers immediately. Real money-making opportunity. Write or wire us for protected territory offer.

INTERNATIONAL OIL HEATING CO.

3800-10 Park Ave. St. Louis, Mo.

-----CLIP THIS COUPON-----

International Oil Heating Co., 3800-10 Park Ave., St. Louis, Mo. Dept. 22-0

Send your free booklet and free details on home heating for stove..... furnace.....
Also how to get a burner without cost.

Date.....

Name.....

Address.....

City and State .....

☐ Check if interested in making money as an International representative with protected territory.

OCT., 1933
VOLUME X
NUMBER 6

MODERN MECHANIX AND INVENTIONS

Donald G. Cooley
EDITOR

PRICE 15 CENTS
(20 CENTS IN CANADA)

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EDITED BY EXPERTS

Listed here are the members of the Modern Mechanix Board of Editors, all qualified by national repute to serve as authorities. They will gladly answer questions from readers if stamped envelope is sent. Address them in care of this magazine, 529 S. 7th St., Minneapolis, Minn.

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Plane Talk Editor

Pilot Gene Shank
Famous Aviator, Holder of Light Plane Endurance Flight Record

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New York Editor

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Principal, Cincinnati Automotive Trade School

Weston Farmer
Consulting Editor

J. Russell Dye
Associate Editor

William J. Kostka
Associate Editor

"I Saved Six Orders and Made $90 in One Day . . . Thanks to This Pocket Volume!"

I'VE only been selling about a year. When I broke in, though I realized that trained salesmen are the highest paid men in the world, I expected the going to be hard at first. It was—a lot harder than I'd expected, even. At the end of six months I was commencing to get discouraged. I certainly hadn't made a flop of it—but I wasn't getting the results I should have had.

Naturally, seeing other fellows who started right with me go right ahead, I realized something was wrong. A particularly disheartening thing was the fact that at times I'd be right on the point of closing a good-sized order—and all of a sudden, it would go "flop." In fact, it kept happening all the time. I was doing something, I knew, that was killing those sales.

Finally I decided that I had to do something. I had been hearing a lot about National Salesmen's Training Association. But I'd never investigated them. Then, one day, I read one of their announcements. I was amazed to find how comprehensively they covered the training of salesmen. Furthermore, they announced that they were sending a most unusual volume, "The Key to Master Salesmanship" to ambitious men who asked for it—not only experienced salesmen, but men who had never sold, but wanted a chance in this highly paid field.

Naturally, I wrote for it—it seemed to me that here was the certain solution to the errors I had been making. Imagine my surprise—and interest—when there arrived, not only one book, but two. To this day I can't decide which of those books helped me most. The little book which I had not been expecting was just what I needed at the time. It was written for men just like me—men who had been plugging along in salesmanship—never successful, never so hopeless that they quit selling. And while "The Key to Master Salesmanship" gave me an insight into the real secrets of salesmanship, the other book, "Mistakes Commonly Made in Selling" was the one I could first get practical use from.

Right in the first few pages, I saw some examples quoted. They were things I had been doing every day. I'd never dreamed they were dangerous errors. The more I thought about them, the more clear it became, though, why I was having such difficulty with my closes. I thought to myself: "By golly, that's why Barnes decided to put off buying, this very afternoon!" I kept on thinking of men whose orders I had lost, through just that very mistake. There were six of them.

The next morning I sallied out, bright and early to see if I couldn't save those sales, using the tips given me. Before noon, I had put the practical suggestions of that little book to work—and sure enough, in every case, I made the sale which I had thought was gone glimmering. Six sales saved—at $15 commission apiece, that was $90 made, by one morning's work, plus the advice of a little book that cost me nothing!

Of course, that set me to thinking. If that one piece of knowledge could make me $90, how much would I make out of having all the knowledge which the National Salesmen's Training Association could give me? It didn't take long to figure that one out, either! I was enrolled for the full training that same night; and the next two weeks saw my sales record soar. Not a minute of time lost—I studied just in spare hours but I learned things in those spare hours that I'd never have picked up, just by my own experience.

Today, I find amazing increase in the volume of my sales now over what they were a year ago. Then I was selling only about 40% of my quota — this month, with a quota twice as high as it used to be, I'm 50% over! And you know what quantity production means when the bonus checks roll around!

Today any man who wants to see how to end some of his biggest sales weaknesses can learn from this book some of the most frequent mistakes which spoil sales, and get practical suggestions how to end them. Not a penny of obligation—"Mistakes Commonly Made in Selling" is now FREE to any ambitious man. At the same time we will send you, also free, the new and finer edition of "The Key to Master Salesmanship," which since its publication has been read by many men who have got into the biggest pay class of salesmanship. Write for both these valuable volumes now — the coupon will bring them by return mail.

A NEW AND FINER EDITION

Thousands who read the original edition of "The Key to Master Salesmanship" are men who today are among the leaders of successful selling. Today, in addition to "Mistakes Commonly Made in Selling," we are sending "The Key to Master Salesmanship," in its new and finer edition, the product of years of salesmanship research, FREE to salesmen. Real ambition, and a desire to make the most of salesmanship, are all you need to get this volume. Simply mail the coupon and it will be sent to you, with your own copy of "Mistakes Commonly Made in Selling."

NATIONAL SALESMEN'S TRAINING ASSOCIATION

Dept. R-706, 21 W. Elm St., Chicago, Ill.

National Salesmen's Training Association, Dept. R-706, 21 W. Elm St., Chicago, Ill.

Without obligation to me, please send me "Mistakes Commonly Made in Selling," as well as "The Key to Master Salesmanship," and full details of your various service features, including your Free Employment Service.

Name .....

Address .....

City ..... State.....

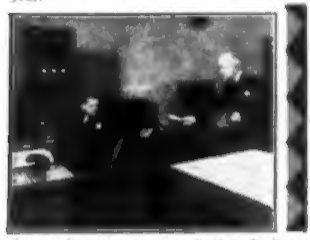
Age..... Occupation.....

Broadcasting Stations employ trained men continually for jobs paying up to $5,000 a year.

I WILL TRAIN YOU AT HOME

Many Make $40, $60, $75 a Week in Radio -- *the Field With a Future*

My book, "Rich Rewards in Radio," gives you information on the opportunities in Radio and explains how I train you quickly to become a Radio Expert through my practical Home Study training. It is free. Clip and mail the coupon NOW. Radio's amazing growth has made hundreds of fine jobs which pay $40, $60, $75 a week. Many of these jobs may quickly lead to salaries as high as $100, $125 and $150 a week.



Police Departments are finding Radio a great aid in their work. Many good jobs have been made in this new field.

Radio—the field with a future

Ever so often a new business is started. You have seen how the men who got into the automobile, motion picture, and other industries when they were started had the first chance at the big jobs—the $5,000, $10,000, and $15,000 a year jobs. Radio offers the same chance that made men rich in those businesses. It has already made many independent—will make many more wealthy in the future. You will be kicking yourself if you pass up this once-in-a-lifetime opportunity.

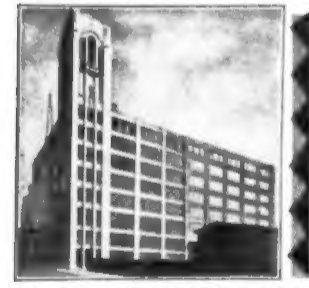
Spare time set servicing pays many N. R. I. men $5, $10, $15 a week extra. Full time men make as much as $30, $60, $75 a week.

Many Radio Experts make $40-$60-$75 a week

In a few years 300,000 jobs have been made by Radio's growth. Thousands more will be made by its future development. Men with the right training—the kind of training I will give you in the N.R.I. Course—have stepped into Radio at 2 and 3 times their former salaries. Experienced service men as well as beginners praise N.R.I. training for what it has done for them.

Many make $5, $10, $15 a week extra in spare time almost at once

My course is world-famous as the one "that pays for itself." The day you enroll I send you instructions, which you should master quickly, for doing 28 Radio jobs common in most every neighborhood. Throughout your Course I will show you how to do other repair and service jobs on the side for extra money. I will not only show you how to do the jobs, but how to get them. I'll give you the plans and ideas that have made $200 to $1,000 a year for hundreds of fellows. G. W. Page, 110 Raleigh Apts., Nashville, Tennessee, writes: "I made $935 in my spare time while taking your Course."



Radio Factories—Employ testers, inspectors, foremen, engineers, servicemen, for jobs paying up to $7,500 a year.

Get ready for jobs like these

Broadcasting stations use engineers, operators, station managers and pay up to $5,000 a year. Radio manufacturers employ testers, inspectors, foremen, engineers, servicemen, for jobs paying up to $7,500 a year.

Television—the coming field of many great opportunities—is covered by my course.

SPECIAL FREE OFFER

I'll send you a Free Lesson to prove that my Radio Course is easy, practical. That's how confident I am that I can train YOU at home in your spare time to become a Radio expert. Only my students could have this book in the past. I KNOW that when you see it, read it, examine it, you will be delighted with its clear, simple way of teaching Radio. I KNOW—because I have ALREADY trained thousands of men. Many of them with not even a grammar school education, and no Radio or electrical experience, have become Radio experts and earn two or three times their former pay. Mail the coupon now.

I HAVE STARTED MANY IN RADIO AT 2 AND 3 TIMES

$400 Each Month

"I spent fifteen years as traveling salesman and was making good money but could see the opportunities in Radio. Believe me I am not sorry, for I have made more money than ever before. I have made more than $400 each month and it really was your course that brought me to this. I can't say too much for your school." J. G. Dahlstead, Radio Station KYA, San Francisco, Cal.

$800 in Spare Time

"Money could not pay for what I got out of your course. I did not know a single thing about Radio before I enrolled, but I have made $800 in my spare time although my work keeps me away from home from 6:00 A. M. to 7:00 P. M. Every word I ever read about your course I have found true." Milton J. Leiby, Jr., Topton, Pa.

Chief Engineer Station WOS

"I have a nice position and am getting a good salary as Chief Engineer of Radio Station WOS. Before entering Radio my salary was barely $1,000.00 a year. It is now $2,400.00 a year. Before entering Radio, my work was, more or less, a drudgery—it is now a pleasure. All of this is the result of the N.R.I. training and study. Your course is by far the simplest, clearest I have yet seen. You gave me my first important position. After I accepted this position a number of others were offered to me as the result of the efforts of your Employment Service." H. H. Lance, Radio Station WOS, Jefferson City, Mo.

TO BE A RADIO EXPERT

Act Now --- Mail Coupon Below for Free Book of Facts and Proof

spectors, foremen, engineers, service men, buyers, and managers for jobs paying up to $7,500 a year. Radio dealers, jobbers (there are over 25,000) employ service men, salesmen, buyers, managers and pay up to $100 a week. There are hundreds of opportunities to have a spare time or full time Radio business of your own. I'll show you how to start your own business on money made in spare time while learning. My book tells you of other opportunities.

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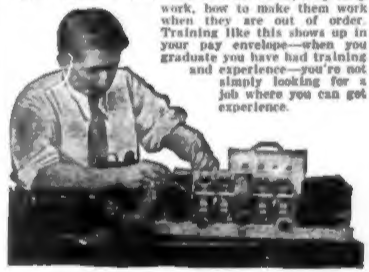

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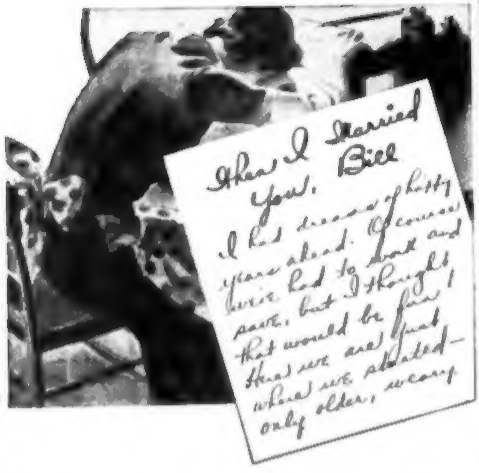

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Andy's Shop Mail Box

The increased pages in this issue crowd Andy down to a two-spread, so he has a lot to say in a hurry. Sail in and get the latest low-down on doings at the M-M field.

HEIGHO, me lads! And October is here again, with the falling of leaves, the booting of feet-balls and the quailing of quail.

I am pleasantly surprised in learning I haven't much to do this month. I've been saving a big batch of stuff on the spindle—just about ready to run it—when along comes old NRA and up goes advertising and the number of pages in the good old Family Ship until I, mere Andy the Grease-monk, am crowded into a limit of two pages to tell you what there is. So I gotta skim the cream Here's a bounce back from that gent called the Sage of Dunedin, anent whom we published a foty graft last month:

Andy, yuh Oleaginous Simian!

Since you're starting a coupla guessing contests on J.G.H., it's only fair to give the cash customers some factual data, from a man who knows, on which to base their guesses.

First, as to the photo sent in by that old grapefruit juicer O'Connor. You say the suspect is wearing a straw hat, which proves he is NOT J.G.H., as the genuine Sage wears only a Panama, if any.

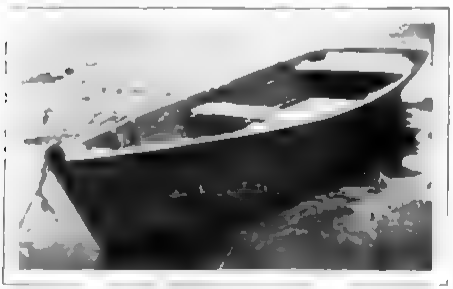
Second, as to the description sent in by that lousy Republican, Ferry Much Wrong, alias F. M. Wright. J.G.H. stands 5'9", which is above the average height in the Army and Navy, and weighs (when eating regular) 164 pounds, which is all the life insurance standard tables allow for that height. So that proves Wright is Wrong—and how!

Further, I've seen the boat he saw, and in proportion, plan, profile, and section it is no more like a Greek sponger than like a Mississippi river steamboat. Which further proves that Wrong, besides being a Republican, is a cock-eyed son of a sea cook and don't know boats from beans.

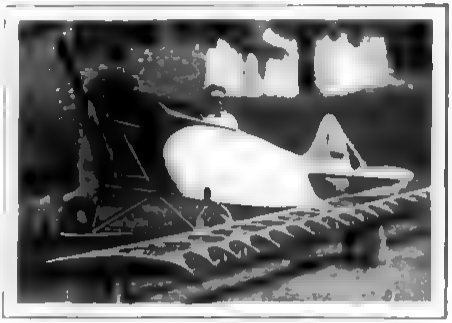
Quod Erat Demonstrandum.

John G. Hanna.

After all this outburst there should be a footnote, but my feet hurt.



Mr. Radcliffe Robinson, of Damariscotta, Maine, built this version of "All Sorts"



The Parasol built by Claude Sessions is a clean job of building. Claude tells of a radial he is building which will soon power the sweet little crate.

The plight of the lightplane builder continues unabated. Seemingly nothing has been done to help the little fellow get into the air. A few intrepid gents are doing some good old fashioned fancy right and left hand flying on the bootleg order, far from civilization and its silly laws, but the boy near a municipal airfield is out of luck in most states, and will be until the Dept. of Commencement decides to cut out the monkey business and let men fly who will fly anyway. Hearken to Claude Sessions:

Dear Andy:—

I am sending pictures of a Henderson powered light plane of the parasol type designed and constructed by myself. This little plane has not been thoroughly tested out but several hedge hops have been made with it by a student pilot.

I have made a study of light airplanes for a good many years and have had the assistance and worked with some of the best army designers including Mr. O. H. Snyder of Dayton, Ohio. Mr. Snyder designed and built the Baby Bomber, a small biplane powered with an Indian V twin motorcycle engine.

It will be seen in the pictures that a nose over skid has been attached. Such a device I believe should be on all small experimental planes especially during the testing out period, however, a small wheel would be better. Several times this skid has saved my propeller from becoming broken.

A three cylinder radial engine is being planned for this plane using Gnome cylinders with a specially designed head. These cylinders are extremely light, weighing only 4½ pounds. They were turned from a solid steel forging which weighed about 80 pounds.

Yours truly,

Claude Sessions.

Fun for me the way all these shots come in of the stuff the lads in the M-M hangar are doing. Latest big bang is a letter from Radcliffe Robinson, up in Maine, who writes about his All Sorts.

Damariscotta, Me.

Dear Andy—

From up here in Maine comes three cheers for M.-M., and "Andy's Mail Box." Keep it up, great stuff.

I'm shooting along a pic of my version of "All Sorts". Oh, yes, I changed the plans, and please don't throw any Irish confetti. These depression times you know, and in some places I had to make the plans fit my material. I also stretched it out two feet, and I still think it was a good idea, as I have two more feet of darn good boat.

I wish you would tell the guy who edits "Oddities of Science" to be more careful of what he puts on his page. I tried his idea of shooting at an empty egg shell, on a thread at fifty feet, with disastrous results to the egg shell. I'm sure no hen even laid that egg he was referring to.

How about some more dope on dirt track racers, Andy. I'd like to see some good plans on converting a model A Ford. You print 'em, and I'll promise to follow them to the letter, that is if my pocketbook will stand the strain.

Love to you and the pig,

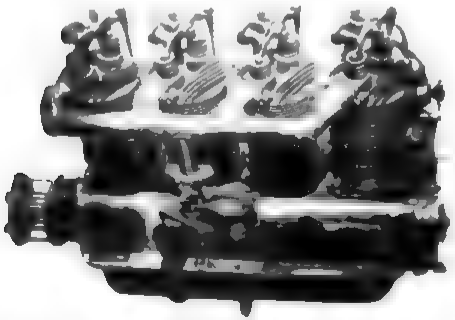
Radcliffe Robinson.

Well, as long as Robinson is politician enough to condone his alteration of the plans by saying it makes just two more feet of good boat, I guess we can forgive him.

* * *

But as a crowning example of what is apt to happen when the amateur brainbright gets to monkeying with the carefully worked out plans of men who have spent years learning their airplane design or their boat or radio design work, I can't help publish here the photo I announced last month; namely, the atrocity sent me by a group of sailors at Santa Monica, saying that it was a Dorothy, or started out to be. Ye gods! The raised deck, trunk cabin, pilot-housed thing off to starboard has no more claim to being a Dorothy than the designer's original work was a copy of Mona Lisa And the lads who sent it are one in saying all the boys in Santy Monic wish the thing weren't in the harbor

* * *



Here's a little four-cylinder job built by an M-M reader for lightplane use. Le Rhone cylinders are used.

When a Boat Is Not a Boat

Sailors at Santa Barbara sent Andy this shot claiming it was a Dorothy design. A Dorothy hull maybe, but that doesn't make her a Dorothy, because the owner has added and subtracted until the poor designer could be forgiven for going crazy. She is not the boat her planner designed.

Les Long has something interesting to say about the Longster. To continue in his words, "It might interest you to know that a Longster built in England this year has given them quite a surprise over there. Possibly you have heard from the builder. He put a Salmson in it and the performance was naturally great.

"The climb was 1700 f.p.m. actual, high speed 120 m.p.h., and the ship landed at an even 30. He took it to Germany and toured the entire country, letting a lot of crack German pilots fly it.

"Being very light in comparison with their ideas of light planes it proved rather startling. I sent him a copy of the '33 FM and he built the ship in 3 weeks. Incidentally he is starting another."

* * *

For the benefit of newcomers to the crew of this good old family almanac, let me state that the lightplane referred to was run complete in plan form in our 1933 Flying Manual, which can still be had for fifty cents the copy postpaid at this office, 529 S. 7th St., Minneapolis, Minn.

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Shrinking the Shirt of Father Time

(Continued from page 53)

and his wife and their trim red monoplane, flew the Atlantic again to survey an Arctic commercial air lane between the United States and Europe.

Two French aviators, Lieuts. Maurice Rossi and Paul Codos, shattered the long distance flight record by flying approximately 5,800 miles in 57 hours from New York across the Atlantic and Europe to Ryack, Syria, in Asia Minor.

Counting each of the 24 planes of Balbo's armada, there have been 52 Atlantic crossings this summer with not a single engine failure over the ocean.

Wiley Post's flight was the most sensational of these air sagas.

A controllable pitch propeller, a secret radio direction finder, and an automatic pilot helped him to better the around-the-world record set by himself and Harold Gatty in 1931 by 21 hours and one minute.

He shot around the world, 15,400 miles, in 7 days, 18 hours, 49 minutes. In addition he made the fastest flight from New York to Berlin, 3,900 miles in 25 hours and 45 minutes; he was the first trans-Atlantic flyer since Lindbergh's Paris hop to reach his destination; the first to fly solo around the world; and the first to solo across the Pacific.

Post's "Winnie Mae" was the first plane to fly across the ocean with an automatic pilot, a gyroscopic device to keep the plane on its course, maintain altitude and lateral stability.

Post showed the possibilities of developing planes for tremendous speeds guided by mechanical devices, but Gen. Italo Balbo impressed the world with the military value of flying ships.

During his long flight to Chicago's Century of Progress the radio equipment of his 40,000 horsepower armada, carrying 100 men, was never out of touch with the home base at Orbetello, Italy. Italian ships, submarines, and land stations based across the Atlantic constantly advised the flying fleet of twenty-four seaplanes of weather conditions ahead and were always ready to rush to their aid.

Brig. Gen. William E. Mitchell, former Air Corps Commandant, said of the flight:

"There's a great lesson in that Italian flight. We ought to take heed. This flight alone has shown that Italy can cover all of western Europe in one flight, spread destruction in a few hours, and get her forces safely back to their hangars."

The Lindbergh surveying flight to the Arctic was not as sensational as those of the Italians or Wiley Post.

The purpose of their flight was to seek and inspect prospective landing places for the Pan American Airways proposed air line to Europe. Radio testing and direction finding and the effects of the Magnetic Pole and Northern Lights on the monoplane's instruments were studied not only by Lindy, but also by Mrs. Lindbergh, who holds a radio operator's license and can handle a key better than her husband.

Post, Balbo, Lindbergh, Rossi and Codos have made Father Time's hour glass appear to be a slow, ancient time keeper. The sand glasses of the future must count seconds, not hours, when the feats of these air pioneers pass into history and are supplanted by more amazing air conquests

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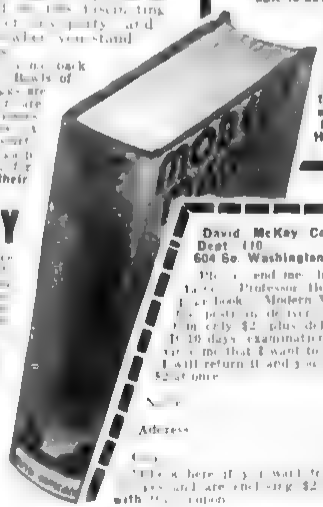

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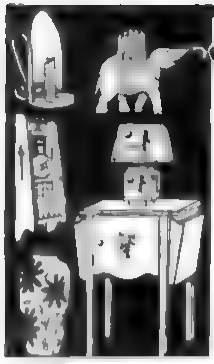

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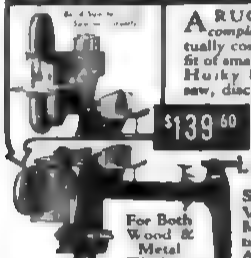

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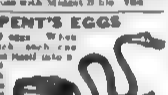

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MISCELLANEOUS

LOCOMOTIVE Pictures [illegible]

MODEL ENGINE

[illegible] Hornet, [illegible] Hydro Hulls, [illegible] gasoline motor, miniature [illegible] Kits for Model Boats. Catalog [illegible] Control, 96 McDonough St., [illegible] N. Y.

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FILMS developed 5c per roll, print[illegible] each. Ask for Special Bargain List. Roanoke Photo Finishing Company, 159 Bell Avenue, Roanoke, Va.

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READ "Foerman's Modern Gold Mining and Prospecting Methods." It pays. Interesting large instructive Bulletin free. Empire Publishing Company, Coeur d' Alene, Idaho.

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RAISE rabbits for us. We supply stock and buy what you raise. Catalog for stamp. Stahl, Suite 31, New City, N. Y.

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PATENT device sharpens all razor blades. 10c postpaid. Geo. Nichols, Box 99, Newhall, Calif.

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PAIR Breeders [illegible] Bull frogs sell $1.00. $[illegible] Hide Profit. Unlimited Market. Easily raised. No winter care. Interesting book "Fortune in Frogs." Free. American Bullfrog Industries, (119) Fremont, Ohio.

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GUARANTEED "Pocket Radio", $2.00. Catalogue, 10c. Neil Tasker, Shamokin, Pennsylvania.

WHOLESALE Short Wave catalog. Sets, Supplies, 10c. Federal Radio & Telegraph Co., 4222 Clifford Road, Cincinnati, Ohio.

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STRANGE Chemical Sponge cleans cars like magic. Banishes auto-washing drudgery. Sells on sight. Sample Outfit Free. Kester Mfg. Co., Box 2499, Akron, Ohio.

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EVERY man is a handy man with this manual. Hundreds of how-to-make and how-to-fix items. Send 50c to Modern Mechanix and Inventions, 529 South Seventh Street, Minneapolis, Minn.

Explanation of Oddities of Science

Pictured on page 79 of this month's Modern Mechanix and Inventions is a series of illustrations depicting true anomalies of science—things which are true but which we do not stop to think of until our attention is called to the fact by fellow contributors. This month Nic Sprank has chosen the following oddities for the following reasons:

"Part of an airplane is candy," says H. Sevcik, of Bogot, N. J. He's right. Cellulose is used in wing covering on planes to prevent weathering. It is the base in most candy sugars, and is sweet when it deteriorates. Game and cattle will therefore eat the covering from unwatched planes.

"Eggs can be cooked with ice," is the contribution of Leonard Wardlow, Albert City, Ia. Sure: if enough pressure is applied, water will still be in an ice state, though 212 degrees Fahrenheit.

"Your body can withstand a pressure of 30 tons," submits Jane Aker, of Piphi, Minn. Quite so; the area of the body multiplied by atmospheric pressure would equal 30 tons.

How to Make Money with Your Camera

Making Money and Winning Prizes

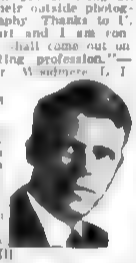
"The I. P. Course has not only been a great pleasure but a great benefit to me. Before I had even finished it I won six prizes in contests, sold five photographs and have had six accepted."—Josephine Davis Town Hall, Monhegan Island, Maine.

Daily Paper Buys

Sold my first picture to a daily paper last week. I have also made contact with the editor of a national magazine and I am doing some work for him. I believe I am to get the job of doing all their outside photography. Thanks to U. I. P. I have made a fast start and I am confident that in time I shall come out on top in this interesting profession."—Charles E. Warren, Jr., Woodmere, L. I.

Gets Three Checks in

"I received two checks for pictures I sold through your service for my first assignment. I owe much of my success to the fine training I received from your course. I am enclosing a picture of myself taken with my Rolleiflex."—Mr. Bernard York, Chicago, Ill.



Already Getting Checks

The letter you sent to me brought me a check from the editor of one of the air magazines. As you know I have sold other photographs with your assistance. And I'm only half way thru the course. I am extremely grateful to U. I. P. for helping me get started."—Capt. C. H. Broach, Bridgeport, Conn.

His Very First Work

"Your picture you suggested that nature magazine brought me a check. I am looking forward eagerly to receiving my Certificate as a member of your organization."—Mr. G. Nassi, Brooklyn, N. Y.

A Natl. Magazine Buys Her Work

I thought you would be interested to know that I sold to a national magazine. Not so bad for my first sale! I really am quite thrilled with my new business. I sold a picture the other day to a magazine and one to a manufacturers association. And, of course, my training is not yet completed."—Mrs. Olive Hastings, Dorchester, Mass.

THINK HOW MANY PHOTOGRAPHS THERE ARE IN JUST THIS ONE ISSUE OF THIS MAGAZINE! Then multiply that by 34,487—the number of publishers in this country who MUST buy photographs regularly. THAT will give you some little idea of the number of pictures being bought EVERY MONTH!

SEVEN MILLION PICTURES A YEAR—that's the conservative estimate of experts! And who gets the millions of dollars that are eagerly paid for these pictures? You in Kansas—or You in Oklahoma—or You in Maine—Yes, YOU! personally can get your share, no matter where you live or what you may be doing NOW!

For the truth is that 7 out of every 10 of these pictures and snapshots are supplied by amateur photographers—working free-lance, in spare time or full time—ordinary non-professional amateurs who have learned how to take pictures THAT SELL!

Millions Paid for Photos

THIS is The Age of Photographs. Your own eyes tell you *that!* And your own purse will cash in on it for you. Just look at the prices on this page. They are not from *professional* photographers. They are from ordinary men and women who have always liked to do a little snapshot work—and who have NOW uncovered an easy way to turn their hobby into money.

For you don't have to be a great photographic expert to make money in this unbelievably fascinating field. It is the technical excellence that makes editors and publishers eager to buy the pictures you can easily produce. It's the knack of knowing WHAT to photograph, HOW to photograph it, and WHERE to sell it, that brings in the money! It's SALABLE and MARKETABLE pictures—full of human interest and popular appeal that you must learn how to produce—not technically beautiful examples of photographic genius!

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Are you interested in making money in this field as merely snapshot amateurs, and most of [illegible] for a few hours a week? Or are you serious and ambitious to be a real success? Then you'll be glad to know that the first step these people took to get into this engaging field was to send for the FREE BOOK described below. This book tells all about the simple training now given by many Universal Photographers. Inc. This strictly practical course of instruction was created by many of the most successful [illegible] Photographers in America—to make it possible for right people to make pictures that sell. And it is combined with an Unlimited Marketing Service which shows you how to sell them!

FREE BOOK

The coupon will bring your copy of "How to Make Money with Your Camera" at once—and not a salesman will call on you. Page [illegible] shows you the vast scope of the field. Page [illegible] tells how 34,487 publishers need millions of your photographs. On Page 7 you will read about the kind of pictures they want—that will bring you a good cash check. Page [illegible] tells how easily you can learn. And on Pages 12, 13, 14 and 15 are printed the pictures and letters of others who, even 4 or 5 weeks after enrollment, are already making the money you can make. The rest of the 24 interesting pages tell about the surprising training. the Unlimited Marketing Service and other features.

There's money in YOUR camera! Mail coupon at once for this FREE BOOK telling you how easy it is to get it out!

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$25 Cash Prizes for Best Answers

(Continued from page 78)

"B" leaves Chicago at 10 A. M. speeding 60 m.p.h. for St. Louis. The distance between stations, for purposes of this problem, is 300 miles. The puzzle is here—when the two trains pass each other which will be the closest to Chicago?

For the best answers to these "scientific why" problems Modern Mechanix and Inventions will pay $25 as follows, First prize $10, second prize $5, 4 third prizes of $2.50 each.

Letters should not be over 600 words in length, and must be postmarked before October 1, 1933.

Decision of the judges is final. In case of ties, duplicate prizes will be awarded. Employees of this magazine and their families, of course, are not eligible to compete, but beyond this the field is open to everyone. You don't have to be a subscriber to the magazine. You don't even have to buy a copy of the magazine. Judges will be Modern Mechanix and Inventions Editors.

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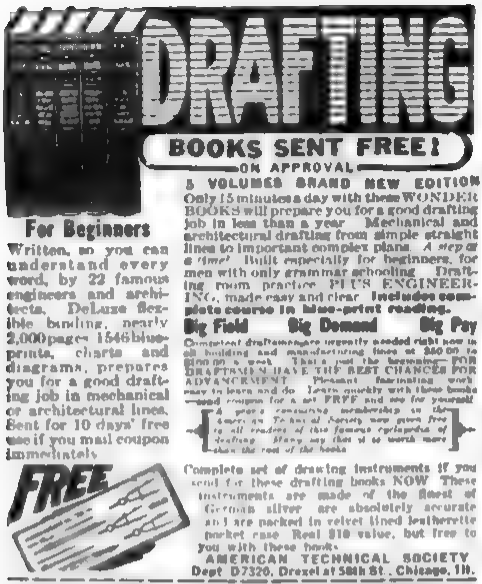
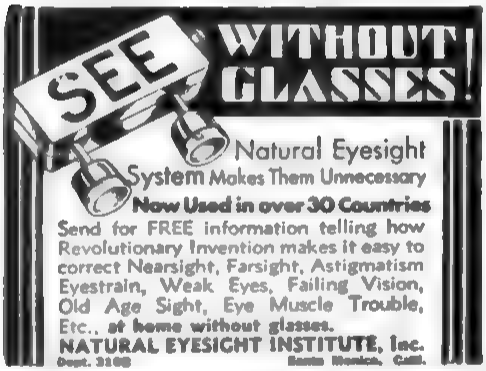




Employment for 500 Men at Once!

A REVOLUTIONARY Chemical Sponge has just been invented that cleans cars like magic. Banishes auto washing drudgery. Also cleans linoleum, woodwork, windows without work! Auto owners and housewives wild about it.

The manufacturer wants 500 men and women at once to help him introduce this strange chemical sponge. He offers to send one for trial to the first person in each locality who writes him. Send in your name today—also ask for full particulars on how you can get the Agency and without experience or capital make up to $90 a week. *Address*

Kristee Mfg. Co., 2440 Bar St., Akron, Ohio

Young Flyer Crosses United States

(Continued from page 67)

So the following June morning, at the earliest sign of dawn, Dave bade his father goodbye Meeker, Senior, winked sleepily in the dim light, grinned and pointed to Mrs. Meeker, sleeping soundly beside him. Dave took the hint and tiptoed out. The putt-putt of his groomed motor must have awakened her, for as he took off from the pasture, a white gowned figure in the kitchen doorway waved reluctantly up to him.

It was now the Pacific or bust and as he gained altitude and leveled off, Dave took out his little diary and jotted down his first log entry. There were to be many more notes before his trip would end, so he wrote closely, in a scrawling, boyish hand, vivid reminders upon which he could later enlarge.

Winging along smoothly, his first stop was Warren, Ohio, where he landed to say goodbye to his grandmother, a kindly, lovable old soul, who knew all about boys and understood "her Davie" even better than his own father. Leaving Warren the next morning, Dave headed into rain and fog near Lake Erie.

Inshore he glimpsed a lake boat, freighting lumber to some port of call. At Toledo Dave descended for fuel, and again at South Bend, Indiana, for the ship's gasoline capacity was limited. Taking off he headed for Lake Michigan and the Windy City.

Chicago began to unroll under his wings, as he flew along the Michigan shore and he noticed at once the beautifully colored World's Fair buildings, their modernistic design and the huge throngs milling along the three-mile wonder display. Deciding to also see the marvels of the age, Dave made a landing at the municipal airport and spent two days taking in the exhibits.

At last leaving the great city, Dave bade goodbye to the captive balloon and a Goodyear blimp that added scenery to the Fair and pointed his Aeronca into a strong southwest wind. As he winged over the farming country, his wheels barely skimmed the ground at times, due to the thermal currents. Sometimes these currents carried him up fifty feet or more, where he waved to the farmers as he sped on west. Finally the motor grew hot and Dave realized that his oil was very low.

Landing at a farmhouse near Bloomington, he rested overnight, secured the precious lubricant and gassed up, then winged on over the gigantic checkerboard field. Soon the wide expanse of the Mississippi emerged from out the hazy distance, revealing flooded areas, as it swept southward to join the Missouri.

Stopovers were made at St. Louis, Springfield Joplin and Tulsa. So far Dave had flown by compass, but now his instrument began to grow erratic, due to the ore deposits, over which he was passing. It made flying increasingly difficult.

After resting at Tulsa, the route lay over a country of oil wells. These grew more and more numerous as Oklahoma passed below. Twenty miles west of Tulsa Dave's attention was drawn to a tornado-like cloud. He cautiously approached, ready to double back on a moment's notice. He soon found out, however, that it was

Young Flyer Crosses United States

an oil fire, reaching its black cloud for a mile, then dipping down like a funnel to the inferno of the well itself.

Hours passed by. Over the Red River Dave was bothered considerably by giant birds with a six-foot wing spread that insisted upon approaching the ship. These, however, finally grew tired of following and Dave dipped down to bunk for the night at a Sweetwater ranch.

Leaving the desert at last, Dave headed into Guadalupe Pass, attaining a six-thousand-foot altitude, between the eight-thousand-foot peaks on either hand. The crystal-clear mountain air made visibility deceptive, distances being twice as far as they appeared.

Mastering his perturbation, Dave continued over the foothills which were at a four-thousand-foot altitude. Sometimes his sturdy little ship would bounce and spin like a leaf, due to the thermal currents. West of El Paso the little Aeronca sped over an extinct volcano, beautifully colored but treacherous. Continuing bravely on, now through frequent sand-storms, Dave glimpsed Deming, New Mexico, but passed it by. Drawing into Lordsburg, he had barely reached the outskirts of the town when a valve spring snapped, calling for repairs.

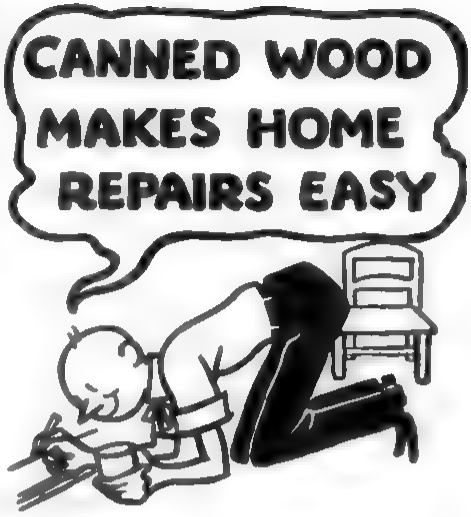
Setting forth the next morning, Dave made steady progress, despite the hot head winds. He passed a long string of freight cars crawling over the sand behind a puffy, dusty engine. When close to the sandy slopes he could see the unfortunate bodies of cows and horses. Further on thousand-foot cliffs slipped by like city canyons.

At Tucson an overnight stop supplied fuel and rest. Northwest of this Arizona town the air was so clear that peaks a hundred miles away could easily be seen. As mountain slopes began to toe into the desert, Dave cut the motor and glided for long distances on the slope currents. As he flew along, he made many entries in his diary. This part of his trip he entered—"Plenty of mountains and desert today. Stopped in Gila Bend. Saw a lot of lizards and jack rabbits."

Now the going was hot, for the sand dunes near Yuma reflected the sun and even with dark glasses it was almost blinding. Soon the Salten Sea was visible and Imperial Valley began to unfold, three thousand feet below. At El Centro Dave stopped, to take off a few hours later for the High Sierras, flying by his instruments. In the high reaches of the range he encountered snow and hail, finding the cold and exposure highly uncomfortable, for his little plane had no enclosed cockpit.

Passing Caruso Gorge, six thousand feet up, Dave saw Barrett Lake below his tires. He was surprised at the sight of green vegetation, for it had been sand and rocks most of the way. Soon pine trees began to prick up into soft, fleecy fog, and Dave flew lower, under the bank of mist. Passing Sweetwater Dam he spotted Mount Helix and shortly landed at Lindbergh Field, San Diego, where he pulled his sturdy little Aeronca into the Airtech shed. The flight from Pittsburgh to the Pacific Coast was at an end.

As Dave rested at the home of relatives, he figured he had been seventy-two hours in the air and that the trip had cost a little less than fifty dollars.



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holes in floor	screw holes
nicks	in plaster

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Homes Promise Increased Comfort

(Continued from page 71)

metal and glass structures they have designed for our habitation are as far ahead of our present day dwelling as 1933 streamlined auto is ahead of spluttering, balky 1904 model Ford.

Several of these new ultra-modernistic dwellings are pictured herewith. Especially noteworthy is the "House of Tomorrow" on display at Chicago's Century of Progress fair.

The edifice comprises three stories, and has plate-glass walls set in steel frames. On the top floor is a conservatory replacing the old fashioned flower garden. Encircling the conservatory is an observation platform from which the country side may be viewed, and where you can relax for a healthful sun bath.

The heart of the structure is the second floor, whereon are found the living rooms, sleeping rooms, as well as a terrace for al fresco dining, dancing, and other forms of outdoor recreation.

Though the walls of the rooms are glass, the inhabitants may have complete privacy simply by dropping the venetian blinds which shut out prying eyes as well as too intense sunlight.

It is the ground floor of the home which will hold the keenest interest of M-M fans, for here is located the garage, recreation room, a workshop, and a hangar large enough to house a light sport plane. In addition, but less interesting, there's the laundry and the heating and air conditioning plant.

Though glass is favored by ultra-modern architects for wall material, metal is fast coming to the fore as a close competitor. The Mellon Institute recently boosted the cause of metal by the introduction of a new marble surfaced steel. The stone effect is achieved by laminated resin woven inseparably with the metal. A wide variety of finishes may be had, ranging from wood to wall paper.

Although home designers do not expect that their innovations will take the country by storm, they do look forward to the gradual displacement of our conventional wood and stone homes by their product over a period of years.

The Automobile of the Future

(Continued from page 47)

having built the first bat-wing airplane ten years ago (the type just now heralded as the coming thing) or if I have predicted the future accurately in designing the first tri-motor cantilever wing air transport which is now accepted as standard, I may be pardoned for feeling that the car of tomorrow will look much like the engine nacelle of a dirigible, that it will be very light and that every part will be hundreds of times stronger than the present materials used in the old fashioned unscientific horse-and-buggy type car we have grown accustomed to.

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MODERN MECHANIX

CAMERA GALLERY SHOWS

Why are houses built with garage in attic? The photo at the left shows you. Below—Look at a bike that rides like a horse.

With the garage in the attic, this California house i real architectural innovation. Reason: Highway is at top of hill beside house.

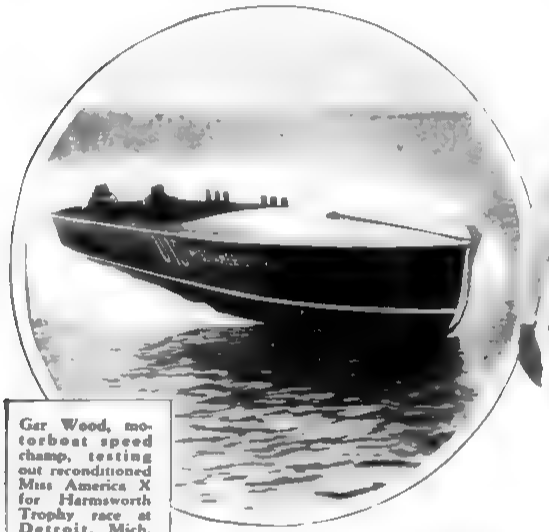
Katherine Ames, movie star, keeps cool when work ing exasperating jig saw puzzle. Pieces float on water in her sumptuous bathing pool.

California lassies concerned over the suppleness of their figures are riding these new-fangled bikes. Seat and pedal action work together to give the sensation of horse back riding. A push-pedaling motion supplants the usual circle-pedaling.

AND INVENTIONS

Latest MECHANICAL NEWS

Can America keep hold of the Harmsworth Trophy? Gar Wood thinks so. Right—Barkeeps pass out real beer where bankers once raked in money.



Gar Wood, motorboat speed champ, testing out reconditioned Miss America X for Harmsworth Trophy race at Detroit, Mich.

Where bankers once withdrew bullion, waiters now withdraw foaming steins of beer.

From bank to beer garden. Vaults of the Philadelphia Trust Co. which once sheltered many thousands of dollars, now hold thousands of bottles of beer. Below—Business men quaffing some 3 point 2 where teller's windows once stood.

EDISON'S Own SECRET

Edison, though materialist-minded, was yet willing to accept spiritual beliefs if they could be proven by scientific tests. Here is described one of his amazing secret experiments whereby he sought to lure spirits from beyond the grave and trap them with super-sensitive instruments.

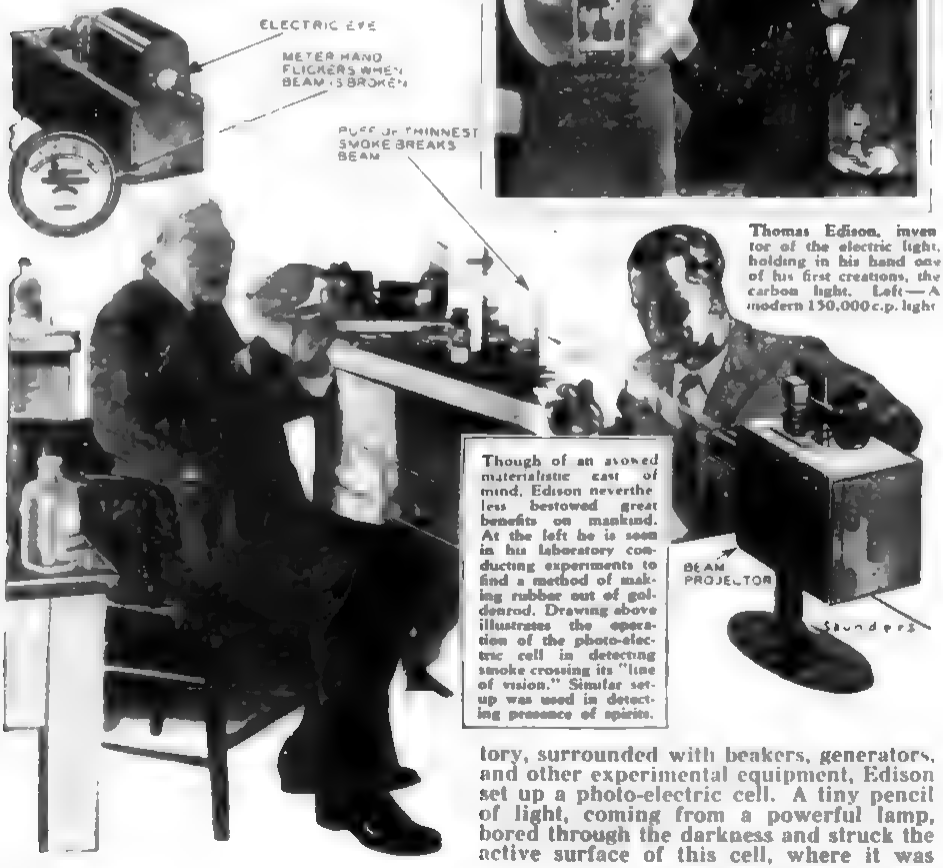
ONE black, howling wintry night in 1920—just such a night when superstitious people would bar their doors and windows against marauding ghosts—Thomas Edison, the famous inventive wizard, gathered a small group of scientists in his laboratory to witness his secret attempts to lure spirits from beyond the grave and trap them with instruments of incredible sensitivity.

Until recently only the few favored spectators ever knew the outcome of this sensational experiment. Only the few Edison intimates, assembled like members of a mystic clan, ever knew what unearthly forms materialized in the scientist's laboratory that night to give proof or disproof of existence beyond the grave.

For thirteen years results of Edison's astounding attempt to penetrate that wall that lies beyond mortality have been withheld from the world, but now the amazing story can be told.

In a darkened room in his great labora-

Thomas Edison, inventor of the electric light, holding in his hand one of his first creations, the carbon light. Left—A modern 150,000 c.p. light



Though of an avowed materialistic cast of mind, Edison nevertheless bestowed great benefits on mankind. At the left he is seen in his laboratory conducting experiments to find a method of making rubber out of goldenrod. Drawing above illustrates the operation of the photo-electric cell in detecting smoke crossing its "line of vision." Similar setup was used in detecting presence of spirits.

tory, surrounded with beakers, generators, and other experimental equipment, Edison set up a photo-electric cell. A tiny pencil of light, coming from a powerful lamp, bored through the darkness and struck the active surface of this cell, where it was

SPIRIT EXPERIMENTS

transformed instantly into a feeble electric current. Any object, no matter how thin, transparent or small, would cause a registration on the cell if it cut through the beam.

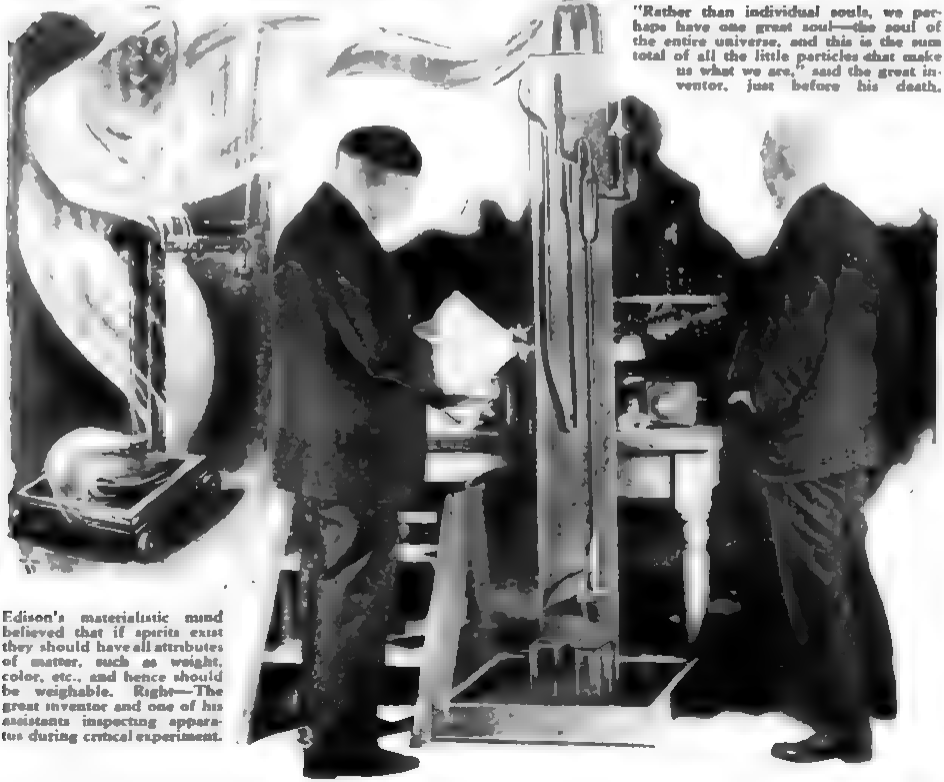
When the experiment was ready to begin the spiritualists in the group of witnesses were called upon to summon from eternity the etherial form of one or two of its inhabitants, and command the spirit to walk across the beam. Then while the spiritualists went through their rites the scientists watched intently the meter of the electric eye, which would flicker the instant any ghostly form interrupted the light beam.

Spirits Remain in Eternity

Tense hours were spent watching the delicate instruments for the slightest indication of a spirit form, but none came. The wind howled around the corners of the laboratory building, the spiritualists exorcised, but the ghosts, if any, remained in their abode in eternity. Narrowed scientific eyes saw the meter's needle remain steady as a rock.

It was because of these negative results that the news of the amazing experiments was never given out to the world. Edison

"Rather than individual souls, we perhaps have one great soul—the soul of the entire universe, and this is the sum total of all the little particles that make us what we are," said the great inventor, just before his death.



Edison's materialistic mind believed that if spirits exist they should have all attributes of matter, such as weight, color, etc., and hence should be weighable. Right—The great inventor and one of his assistants inspecting apparatus during critical experiment.

Edison Believed That Spirits Should Have All the Attributes of Matter

Artist's drawing here illustrates the set-up of the ghost trap. Spirit crossing beam from projector would interrupt light, causing hand on the meter to flicker

Deliberately burning his finger in experiment, Edison found that lines and whorls grew back in original patterns, substantiating his theory of "life units."

would not reveal his belief-shattering discoveries to a believing world.

The great inventor was a realist and his experiment revealed the stony silence his profound mind expected to find. If spiritual entities existed Edison believed that they should have some of the attributes of ordinary matter. Hence his belief that if spirits existed they could be detected by the electric eye.

It was Edison's belief, even up to the day of his death, that life in man and animal results from the activity of countless myriads of what he called "immortal units," endowed with intelligent direction of life and its processes.

To substantiate his hypothesis, Edison burnt his finger intentionally! (Before the finger was burned, however, the scientist had a Bertillion print made of his digit.) The burn was severe enough to obliterate all the delicate skin lines, yet after the finger had healed, another print showed that the lines and whorls, even though they had been hopelessly destroyed, had returned to their original position.

From this experiment, Edison got confirmation of his hypothesis that it is these aforementioned "immortal units" which supervised the regrowth of his finger skin, following out the original design. Man, he believed, is a mosaic of such life units, and it is these entities which determine what we shall be.

To make his hypothesis clear, Edison was wont to cite the following analogy. Suppose this earth were visited by some extra-terrestrial being whose eyes were so coarse that the smallest thing he could see was the Brooklyn bridge. Naturally he would take the structure as some sort of natural growth.

Now suppose this imaginary giant were to destroy the bridge, then, after a couple of years, find it rebuilt. Don't you suppose the giant would assume that some guiding intelligence were behind the reconstruction? That's what Edison believed.

Boat Stilts Double Speed of Racing Craft

Like a flying fish this outboard racer doubled its speed by shooting above the water on newly invented boat stilts.

NEWLY invented boat stilts double the speed of racing craft by lifting them like flying fish above the surface of the water.

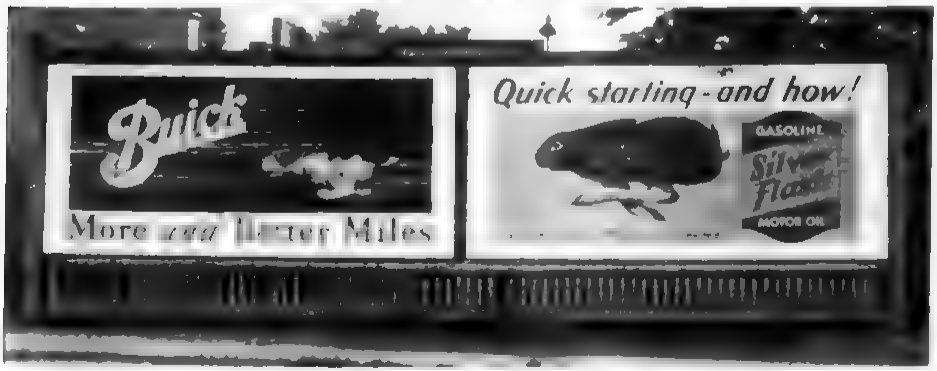
The stilts consist of projections from the hull over which is sprung a 7-foot steel band about four inches wide. As the boat picks up speed the band, acting like the wing of an airplane, lifts the boat from the surface of the water. Thus freed of water resistance and friction the racer skims along at great speed.

The inventor, Dr. Oskar G. Tietjens, of Swarthmore, Pa., believes the device can be applied to cabin cruisers to increase their speed. He calls his invention the "hydrofoil" because it acts in the water as an airfoil, or wing edge, acts in the air. The slope of the hydrofoil blade is two degrees from horizontal, sufficient to lift the boat from the water.

Construction of the boat stilts, that lift the entire hull of the boat out of water, is shown with inventor, Dr. O. G. Tietjens.

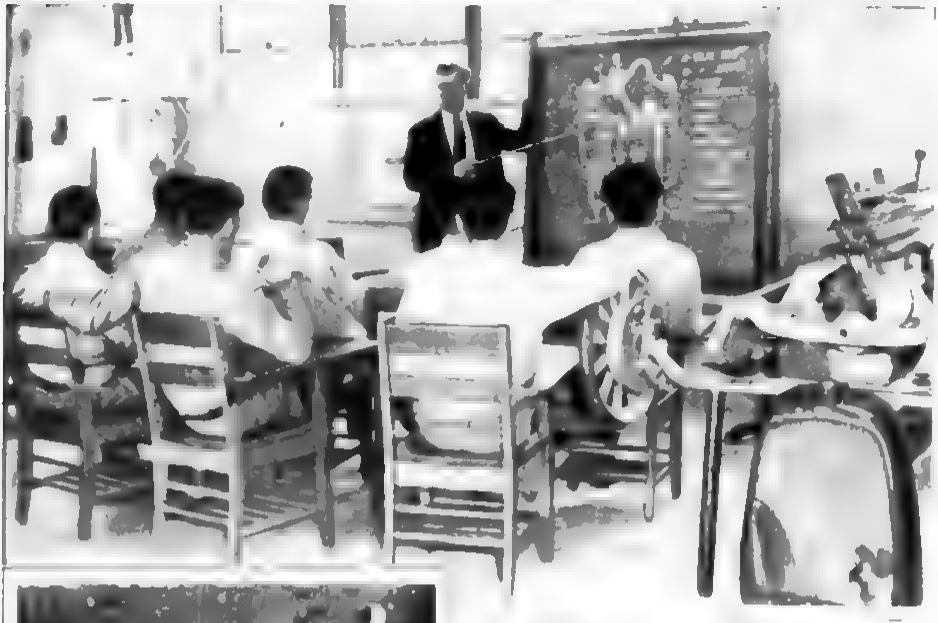
Tables Turned, Hare Chases Dog

WHEN a hare madly chases a hound, it's news, just like that old one about the man biting the dog. The phenomena occurred when bill board hangers put up the advertisements shown in the photograph below. The vicious looking hare appears ready to pounce upon the dog.

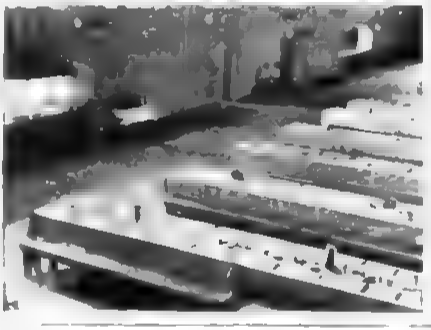


This dog found himself on the wrong end of the hunt when he discovered the hare giving him a merry chase. It happened when billboard hangers put up the advertisements in the manner shown. The race is still being run.

Wall-less Prison is Newest Penal Institute



Future automobile mechanics learn their trade in this modern classroom in New York's new prison without walls. On the chassis and motor on the right the men put their classroom theories into actual practice.



Food riots should not disturb this up-to-date dining room in the wall less prison. Cafeteria system is used, offering the men a variety of tasty meals instead of usual prison fare.

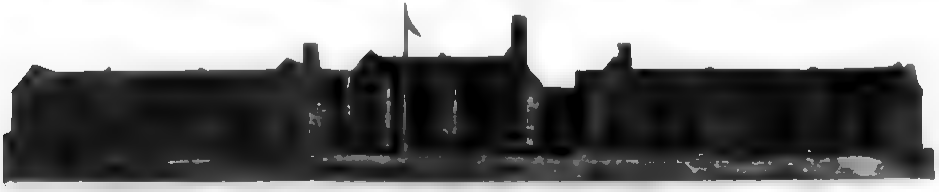
NEW YORK'S new prison without walls resembles a technical college more than an ordinary penal institution.

Its inmates work on no rock pile but go through a regular course of training that prepares them for promising futures in mechanical and agricultural fields. Each man lives in a neatly furnished, bright room instead of the usual bare, gloomy cell.

In modern classrooms, not unlike the schoolrooms of the best universities, the men learn the principles of automotive mechanics, radio, and electricity. Model workshops serve to give them practical experience in trades they will follow when their sentences are completed.

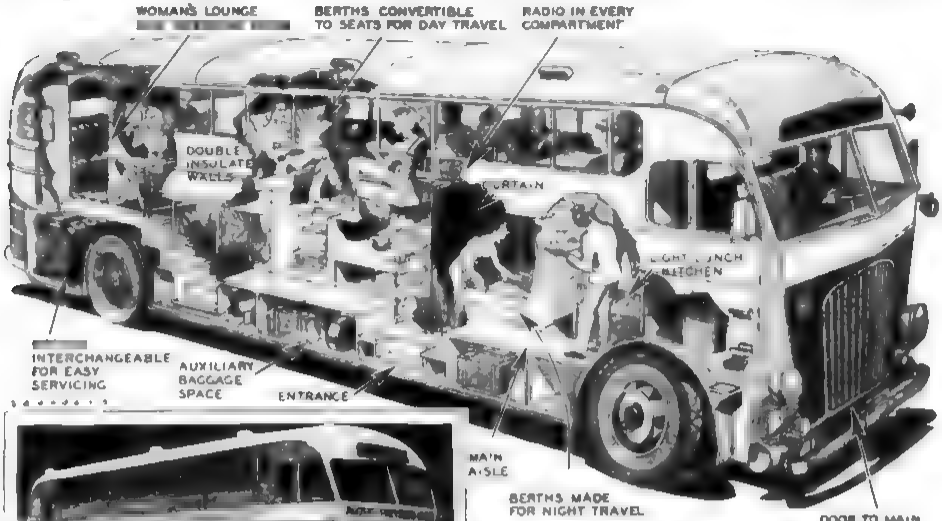
Those desiring to become farmers go through an agricultural course. On a large farm, surrounded by no wall and watched by no armed guards, they put into practice the theories of fertilizing, tilling, production and harvesting learned in the classroom.

When filled the prison houses 504 men. Convicts with good records are selected from state prisons to seek a new start in life in the novel institution located at Wallkill.



More like a college campus is this new prison built without walls at Wallkill, N. Y., for convicts who wish to drop criminal careers for honest mechanical and agricultural pursuits. The men do not live in cells but in furnished rooms.

New Night Bus is Luxury on Wheels



Striking features of night coach are pointed out here. Note baggage compartment in front, motor in rear. Porter makes passengers comfortable.

Pacific coast travelers ride with utmost convenience in this new double deck bus, having day and night accommodations for 25 passengers. Duralumin construction gives lightness.

A NEW trans-continental night coach which will soon be seen gliding along the coast-to-coast highways provides passengers with the last word in motor travel luxury. Inspect the cutaway view of one of these new super-comfort buses above. As you will note, there are five compartments, each containing one double and three single full length berths. For daytime travel a porter converts berths into comfortable seats.

Each compartment is provided with its own heating and ventilating system, radio and washstand with hot and cold running water. Double insulated walls maintain an even temperature within the bus, regardless of outside temperature. A striking innovation is the location of the entire power plant at the rear of the car. A microphone pick-up and loudspeaker tells the driver how his motor is carrying on. When motor goes haywire, it can be replaced in twenty minutes.

Boat or Automobile? It's Both

P. T. BARNUM might have dubbed the contraption shown below a "What is it?" The unadorned truth about the thing is that it is an automotive boat, capable, under power of its Model T power plant, of clipping off a neat 45 m.p.h. on land and 12 m.p.h. on water.

Other details: Driven through water by demountable propeller, underslung, has no springs, clears road by three inches, built in two years by Con Meyer, of Maple Grove, Minn. No blueprints are available.

What is it—an automobile or a boat? It's both. Model T engine makes 45 m.p.h. on land, 12 m.p.h. on water.

Byrd and Ellsworth Race to

ANTARCTICA, the bleak ice-packed continent surrounding the South Pole, will be the scene of a race for scientific discoveries between two veterans of the polar wastes, Rear Admiral Richard E. Byrd and Lincoln Ellsworth.

For two years the two rival expeditions will battle the fierce cold, crushing ice packs, and raging winds of the Antarctic to bring back to civilization some of the secrets of thousands of miles of unexplored land.

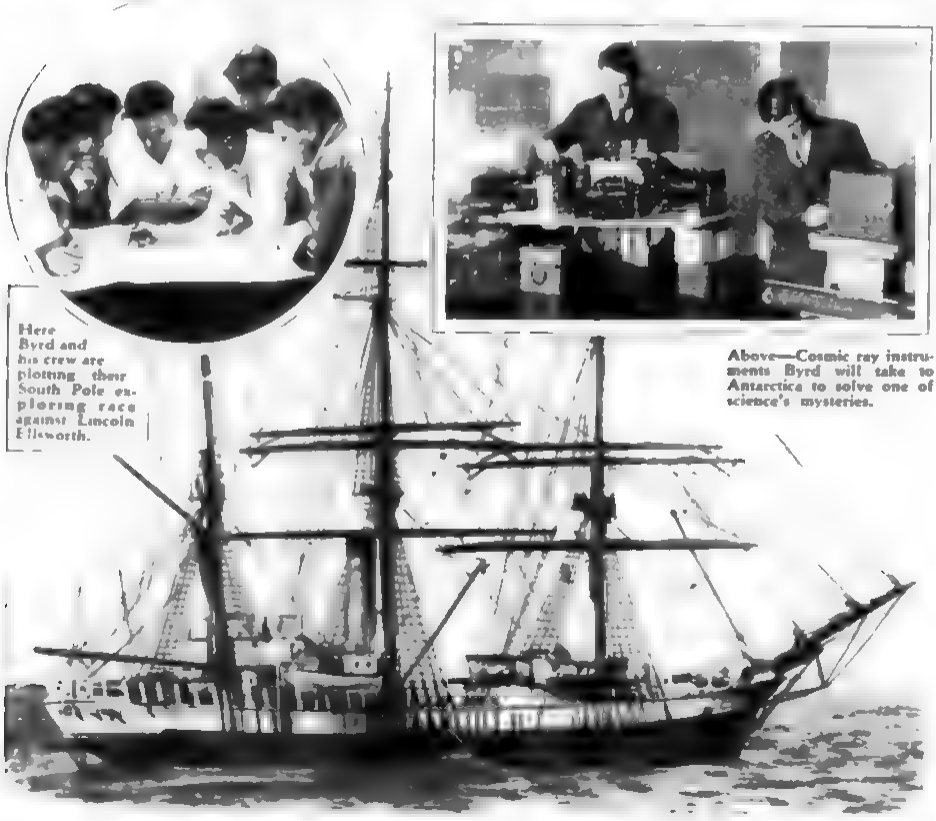
Ellsworth's motor ship, the *Wyatt Earp*, now is on its way to Dunedin, New Zealand, where the explorer will join his crew. On board is a specially equipped camera-mapping airplane with which he plans a 3,000 mile flight over the Pole, the most ambitious Antarctic air expedition ever suggested.

In the 60-year-old cutter *Bear* Rear Admiral Byrd will set sail from Boston late this fall for Little America, his former base.

Both expeditions will vie with each other to discover, map, and photograph the unknown frozen territory in the shadow of the South Pole. In addition Byrd will seek to trap cosmic rays, believed to be ghosts of lost worlds, and thereby add another chapter to the scientific story of the creation of the universe.

Under the direction of Prof. Arthur H. Compton, noted University of Chicago scientist, a trained physicist will accompany Byrd to handle the delicate instruments.

If the rays are found to be abundant at the South Pole, one of the two magnetic centers of the earth, proof will be added to the theory that cosmic rays are made up of electrons and protons, tiny particles of electricity that are forming atoms. The atoms in turn condense into stars, according to the theory. If the cosmic rays bombard the earth no more at the South Pole than at any other part of the earth, the



Here Byrd and his crew are plotting their South Pole exploring race against Lincoln Ellsworth.

Above—Cosmic ray instruments Byrd will take to Antarctica to solve one of science's mysteries.

Byrd's ship, the 60-year-old cutter, Bear, pictured here, will be pitted against Ellsworth's more modern motorship, the Wyatt Earp, built in 1919. The Bear still has her original oaken hull sheathed with iron bark. Behind her is a thrilling history of polar rescues as a coast guard cutter.

SOUTH POLE for Science

rays probably consist mainly of photons, very minute particles of light, with a mixture of electrons and protons. This would tend to prove that cosmic rays are "cosmic debris," liberated 2,000,000,000 years ago, according to this theory, when the single mass of the universe exploded to form the stars, sun and planets.

Professor Thomas C. Poulter, of Iowa Wesleyan university, also will accompany Byrd to make a study of meteors with specially built instruments. Byrd will take two planes for exploration flights.

"The object of our trip is to study more closely the territory named for Mrs. Byrd, which was discovered on our previous stay," Byrd said. "In addition we will attempt to elaborate on the scientific data obtained previously.

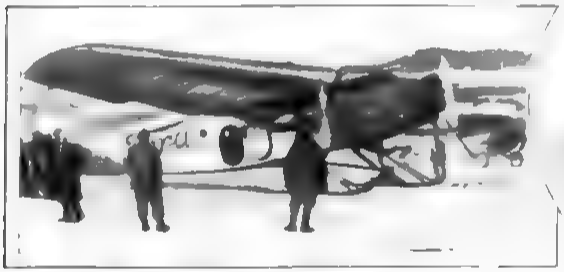
"We hope to salvage the Stars and Stripes and Floyd Bennett, two planes we left behind on our previous trip, and use them to carry freight to our bases.

"Harold I. June, senior pilot, will alternate with me at the controls. I expect to act as my own pilot in a flight to and beyond the Pole."

Byrd's *Bear* was retired six years ago from coast guard service and awarded to Oakland, Calif., as a marine museum.

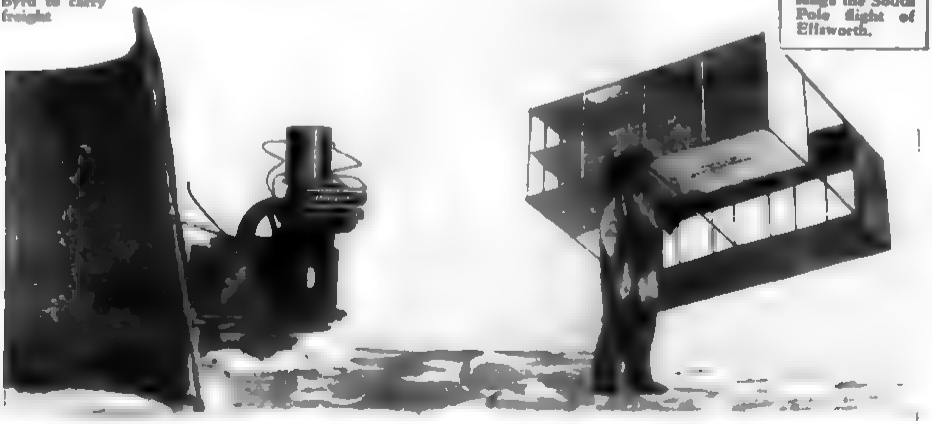
Ellsworth's *Wyatt Earp* is more modern. Built in 1919 of Norwegian pine and oak, her beams and planking are 19 inches thick. She has been fitted with a semi-Diesel type Bolinder engine. The use of the engine is a new experiment in the Antarctic area.

Bernt Balchen, noted pilot, will accompany Ellsworth on his 3,000 mile flight across the Antarctic. Their plane will carry an electrically driven camera capable of taking 6,400 pictures at the rate of an exposure every six seconds on 400 feet of movie film without reloading. The photographs will overlap so as to permit compilation of a fairly accurate map of the country explored.



These two planes, abandoned on Antarctica on previous explorations, will be salvaged by Byrd to carry freight

Admiral Byrd rigged out for the fierce Antarctic cold. His aeronautical skill will challenge the South Pole flight of Ellsworth.



Study of weather forecasting for the entire world will be undertaken by Admiral Byrd at the South Pole with the instruments shown here. A scientist will also accompany Byrd to make a special study of meteors in the polar wastes.

Push Button—Save Self from Drowning

The comely young lady at the left is shown wearing the new Peternella life preserver. Pressure on the plunger of the cartridge at right on belt injects water into chemical container at left. Gas formed inflates belt as illustrated.

THE tragic sight of a swimmer drowning off the Ocean City, N. J., beach set Jago Peternella, a New York engineer, to devising a preventative for such accidents, and the result of his efforts was a novel life preserver which netted him a young fortune.

The preserver consists of a rubberized silk belt, attached to the front of which are two light metal cartridges. When the swimmer is in danger, a plunger is pushed on one of the cartridges, this procedure feeding water into the second container.

The action of the water on the chemical in the container generates a gas which fills the belt instantly to keep swimmer afloat.

Stamp Figures Easy to Change

Turning small knob on stamp adjusts for any letter or figure

TURNING small knob on a new rubber stamp causes the correct letters to come into position, eliminating necessity of shifting letters with the hands. The letters and figures selected are displayed on a dial set in the top of the stamp. A flexible handle assures an even impression.

Easy Steering for Heavy Trucks

THE strength of a Sampson is no longer needed to guide trucks if they are equipped with an air steering control recently introduced. Three chief elements of the device are: A combination of levers mounted on an electric shaft, a control valve, and a double acting cylinder.

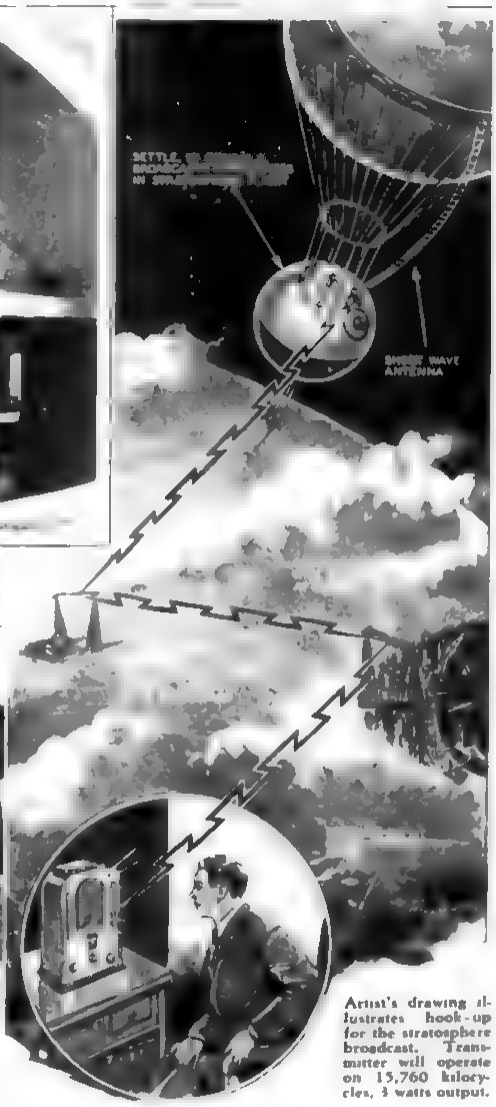
This device does all the work connected with turning the front wheels, no more effort being connected with the job of steering than can be supplied by a child. The device also reduces road shock considerably and minimizes shimmy.

Automotive engineers pointing out the new Bendix air steering control which greatly reduces effort necessary to turn steering wheel. Device attaches to any truck or auto.

Stratosphere Broadcast to Thrill Nation

Lieut. Comm. T. G. W. Settle showing how he will speak into microphone to relate his unusual experiences as he floats through the stratosphere in October flight.

Exterior view of the stratosphere gondola, showing at top the zeppelin antenna which will project Settle's voice to earth. At right is seen Luis Alvarez, cosmic ray expert.



Artist's drawing illustrates hook-up for the stratosphere broadcast. Transmitter will operate on 15,760 kilocycles, 3 watts output.

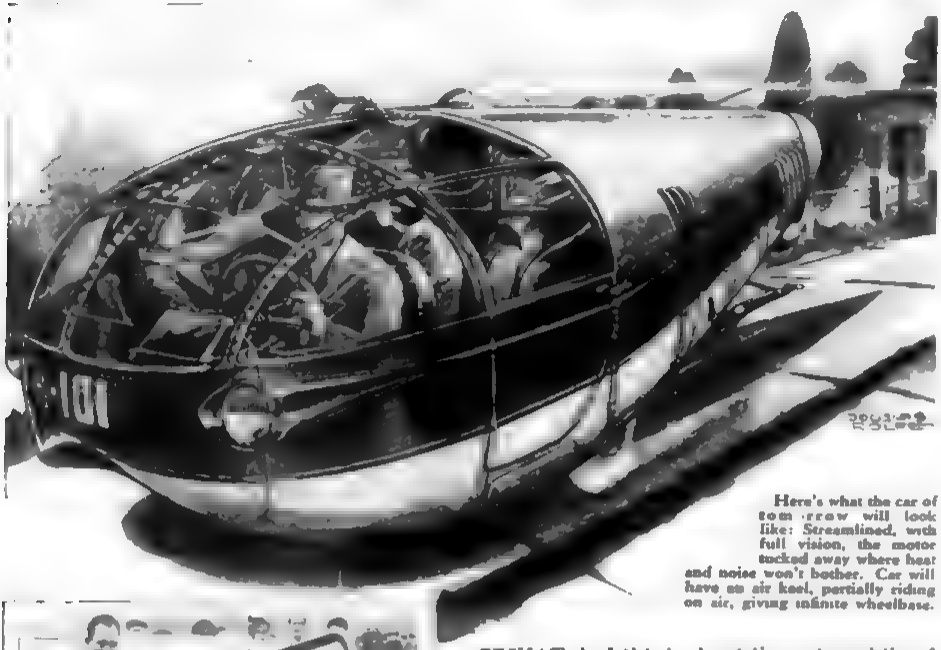
WHEN Lieut. Comm. Settle climbs into the violet reaches of the stratosphere next October, radio fans throughout the nation will be treated to one of the most thrilling broadcasts ever emitted by a loud speaker.

While floating through the upper air Settle will speak into a microphone connected to a midget short wave transmitter, narrating his astounding experiences 11 miles above Old Mother Earth.

Down on the shrunken earth below millions of listeners-in with ears literally glued to the speaker will listen to descriptions of the stratosphere and of the world below, and to the gripping story of the progress of the stratosphere balloon as Commander Settle relates it from his space gondola.

The midget transmitter will project Settle's voice to short wave receivers stationed at strategic points on the earth below. The receiver intercepting the signals (depending on which way the wind blows) will relay the stratosphere voice to Chicago, where it will be put on the air for distribution to the entire nation over a broadcast chain.

The AUTOMOBILE of



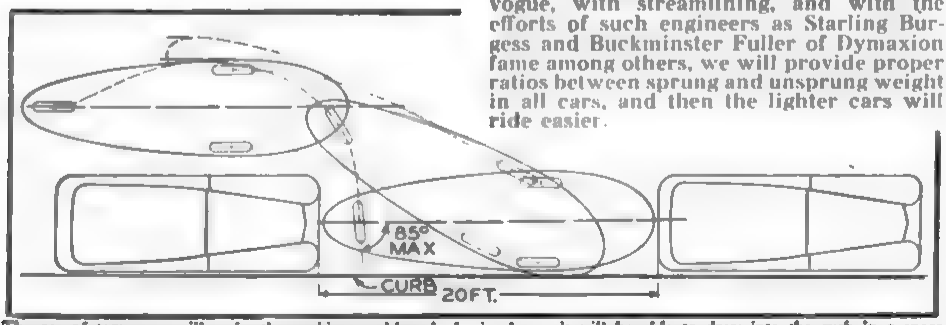
Here's what the car of tom·rrow will look like: Streamlined, with full vision, the motor tucked away where heat and noise won't bother. Car will have an air keel, partially riding on air, giving infinite wheelbase.

Starling Burgess, standing, and Buckminster Fuller, who have beat the parade to the new car. They are shown at the door of the new Dymaxion transport, already built and tried.

WHAT do I think about the automobile of the future?

Well, it will be about one-third the weight of the present car and will, of course, be streamlined. The new cars will all weigh less than 2,000 lbs. and will probably have motors of around 100 horsepower. They will be light weight cars, because the lighter the car the easier it rides.

This may sound like heresy in view of the popular supposition that heavier cars ride more easily. But my statement is true. The reason is not that the car is heavier, but that in heavy cars of today the distribution of sprung and unsprung weight accidentally happens to be better. With the new engineering which has been gaining vogue, with streamlining, and with the efforts of such engineers as Starling Burgess and Buckminster Fuller of Dymaxion fame among others, we will provide proper ratios between sprung and unsprung weight in all cars, and then the lighter cars will ride easier.



The car of tomorrow will make the parking problem look simple, as it will be able to draw into the curb in a space its own length with one manoeuver, as this drawing illustrates.

the FUTURE

by
WM. B. STOUT
As told to Paul Weber

Bill Stout, Detroit inventive pioneer who built the first cantilever wing plane, the first tri-motor, and who has worked for Henry Ford in an advisory capacity, here tells what the car of tomorrow will be like.

Meet Mr. Wm. B. Stout, long recognized as one of the automotive world's leading minds. He designed the fore-runner of today's tri-motored air line airplanes.

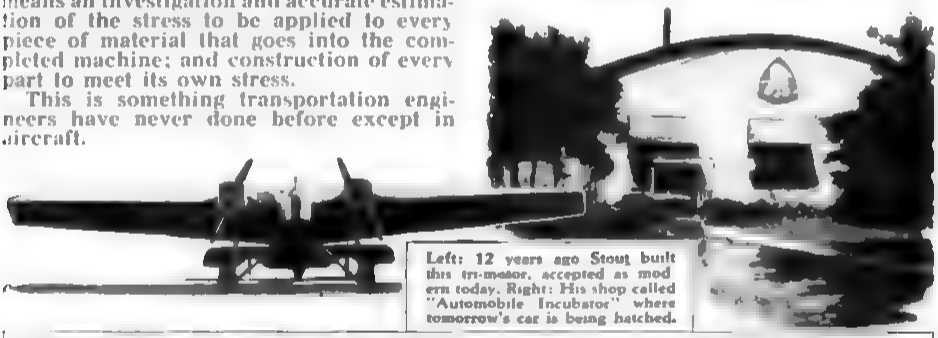
Just what is this new engineering? Let's explain it.

The development of the airplane has given rise to an entirely new type of engineering, which we may call "strength-for-weight" engineering, known as "stress analysis."

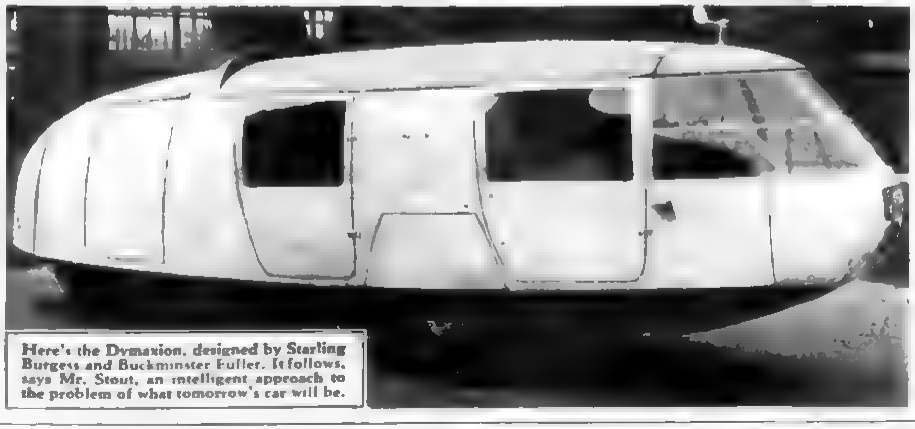
During the depression when airlines are largely out of the market, we airplane engineers have kept ourselves occupied in a very significant way. We have turned airplane engineering to other types of construction. Our absolutely new data on the use of light weight materials, our patiently acquired knowledge of wind resistance and aerodynamics is being applied to the design of these cars of tomorrow, and to locomotives, motor trucks, whole trains and other things.

Now the phrase "Stress analysis" simply means an investigation and accurate estimation of the stress to be applied to every piece of material that goes into the completed machine; and construction of every part to meet its own stress.

This is something transportation engineers have never done before except in aircraft.

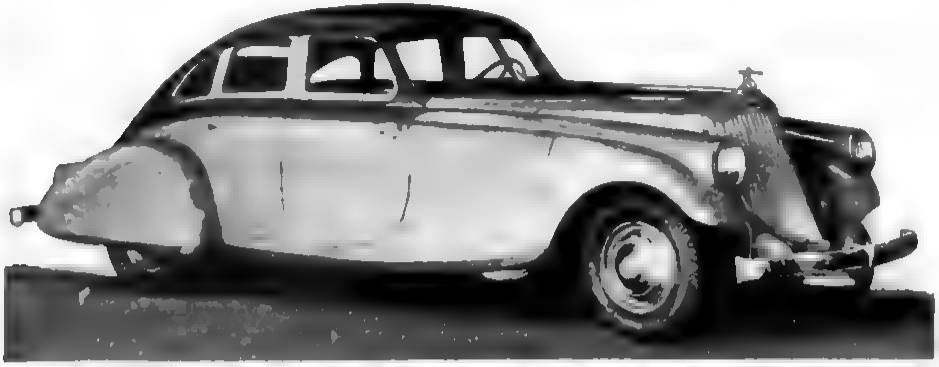


Left: 12 years ago Stout built this tri-motor, accepted as modern today. Right: His shop called "Automobile Incubator" where tomorrow's car is being hatched.



Here's the Dymaxion, designed by Starling Burgess and Buckminster Fuller. It follows, says Mr. Stout, an intelligent approach to the problem of what tomorrow's car will be.

Pierce-Arrow Recognizes Streamline Lessons Gained From Race Cars



Pierce Arrow this season built six of these ultra modern bodies on present day Pierce Arrow chassis. It is probably the first acknowledgment that car styles must change, be more efficient, look better. This special Silver Arrow model sold at $10,000

Influence of airplane engineering is seen in this race car. Power is thus saved in enormous quantities at high speeds.

Every engineer in the game today knows how an automobile is built: The makers lay out a steel frame, hang an engine on it, put a steel box over that, bolt the whole thing together and then add lines to please the buyer's eye. Very seldom is there any effort to analyze the functions which the various pieces of metal, wood, glass and rubber must perform.

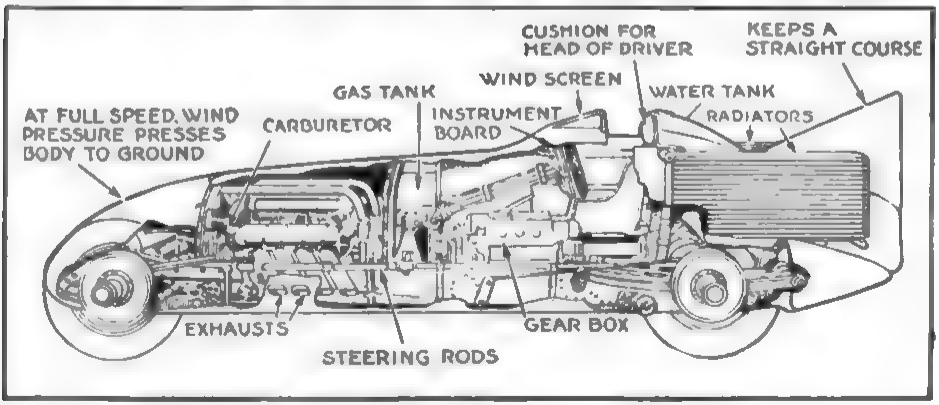
Like Topsy in Uncle Tom's cabin, the design is the result of merest chance. The engineer used to guess at the proper size for a given part, had a casting made, and inserted the part.

Then, if it broke, he made the next one twice as heavy—and often the second piece, though twice as heavy, might be only half again as strong.

Stress analysis will end this hit and miss system. Every part of the car of tomorrow will be made specifically for bearing the specific stress which it must support when the vehicle is in operation.

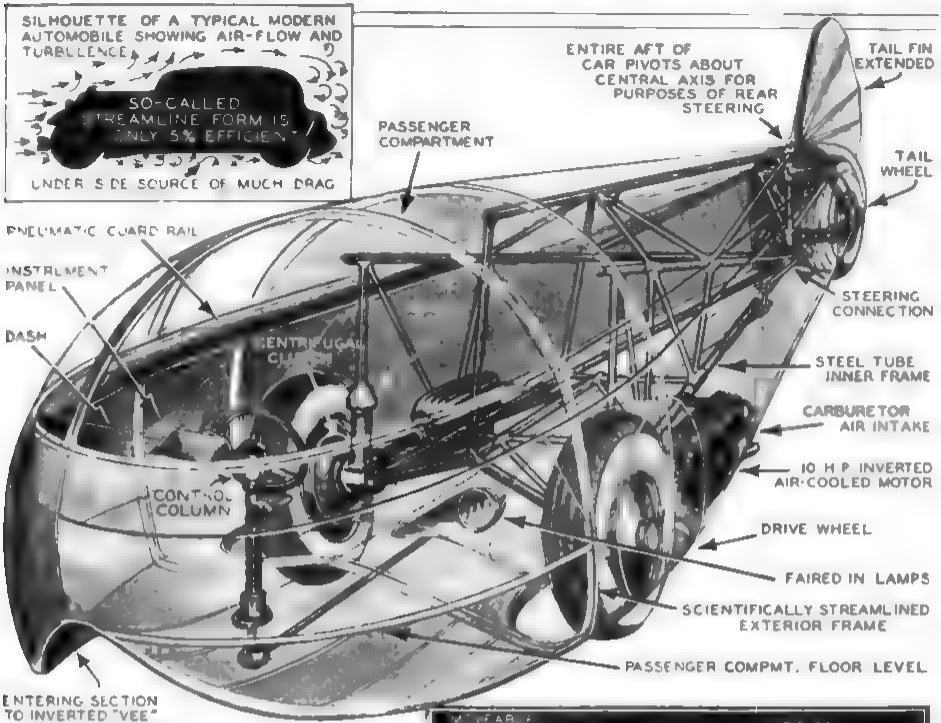
Discarding Old Ideas

The new Dymaxion car produced in the east is a good example of what can be done when old horse-and-buggy notions are discarded. The car of today is really nothing

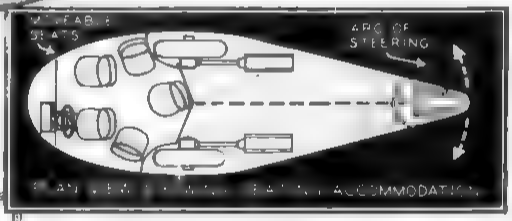


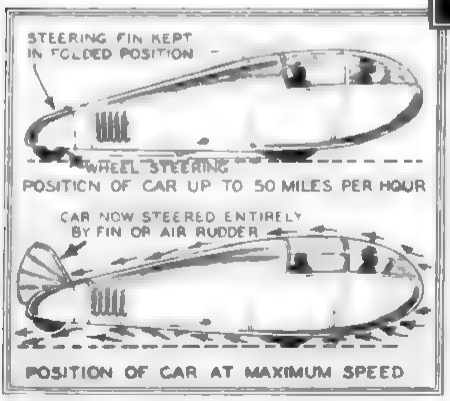
Interesting is this racing car design of last year, foretelling as race cars do what the passenger cars of next year will be like. Design trend is toward three wheel chassis, however, with rear wheel steering. Aerodynamics have been studied, and yielded great results. The air tail and bulbous snout seem certain to be on practically all cars in the near future.

Aerodynamically Efficient Cars Will Replace the Horseless Carriage-Type



Top silhouette shows reason why present day cars have reached maximum of development along standard lines. Center wash shows new Dymaxion proposed after lessons gained in trials of first car. Double motors, independently sprung wheels, tail fin steering are expected to give new motoring thrills. Right inset shows chummy seating possibilities.





Infinite wheelbase is gained with front wheel drive and the inverted V airkeel which lifts the car and allows it to be steered by the retractible rudder shown at the rear. Tests of the original Dymaxion, in which 25% of the weight was on the rear wheel, failed in providing enough lift to elevate the wheel, but with minor shifting of weights this condition is expected to be fulfilled.

but an elaborated horseless carriage, brought to the perfection of its final limitations.

The ideas of Mr. Starling Burgess and Mr. Buckminster Fuller, two enterprising New York naval architects, as embodied in their unique Dymaxion, which underwent trials a couple of weeks ago, must in final analysis be proved by usage, but they are none the less interesting.

Mr. Burgess, a famed yacht designer, is also one of the earliest airplane engineers, having designed and flown the Burgess-Dunne tailless biplane years ago. His idea is unique in using rear wheel steering, allowing fine parking ability and ability to turn in the car's own length. And the Dymaxion is planned to have infinite wheelbase since the wind on her V-keel (inverted) is planned to lift the rear wheels off the road, allowing air rudder steering.

Stress analysis, aerodynamics are already being felt in automobile circles, and if my

(Continued on page 31)

"Floating Harvester" Keeps Lakes Clean

The odd boat pictured here is a floating harvesting machine that cuts underwater weeds in Minneapolis' beautiful lakes. Cutter operates under the surface, rake picks up the weeds

WHAT has been humorously dubbed a "floating harvester," clears Minneapolis' famous lakes of underwater weeds.

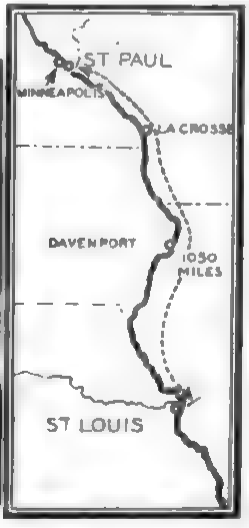
The boat, seen above, presents an odd appearance with its bow hay rake, large umbrella and stern paddle wheel. Actually the contraption has proved quite practical and economical, not only in cutting lake floor vegetation but also in clearing surface water of scum.

An automobile engine drives the stern paddle wheel and operates an underwater cutting device similar to that on a harvesting machine. When the cutter clips the weeds below the surface of the water, they float to the top and are scooped up by the rake.

A rear view of the ingenious lake weed cutter. The boat is propelled by a stern paddle wheel driven by an auto motor.

Rides Inner Tube Boat 1050 Miles

PUNCTURES are the only danger threatening the inner tube boat William Nelsch, of St. Louis, took on a 1,050 mile jaunt down the Mississippi from St. Paul to St. Louis. Nelsch was not worried for he carried a vulcanizing outfit and, if the worst came, he had a spare handy. The boat was equipped with a camping outfit.



Carrying a spare in case of trouble, William Nelsch took this raft, made of two inner tubes vulcanized together, on a 1,050-mile trip down the Mississippi. The seat on the wood floor is a pup tent. The back rest contains complete camping provisions. Nelsch left St. Paul headed for St. Louis, Missouri, along the river route shown on the right.

Sky Winds Turn Mountain-High Windmill

Towering over any other structure ever built by man, a mountain-high windmill projected by Hermann Honnef, German engineer, promises to open up a new source of power to the world. Amazing plans now on the drafting board call for the construction of a battleship-type basket tower, 2,770 feet high, topped by a power generating plant comprising five turbine wheels each 480 feet in diameter and turning out 25,000 K. W. hours each. Operating at extreme altitudes, the mill will be able to take advantage of the wind currents blowing above the 600 ft. level. At the base of the tower will be a stadium housing 40,000 people. Photo shows model of the tower.

SHRINKING *the* SHIRT

Record smashing air feats of 1933, described here, herald era of two-day round-the-world flights, trans-oceanic aerial bombing expeditions, and inter-continental air lanes in the stratosphere.

ASTOUNDING aerial achievements of 1933 presage the dawn of another epoch in the startling history of aviation. Round the world flights in two days; airplanes shooting through the stratosphere, 40,000 feet up, at tremendous speeds from continent to continent; flying military expeditions zooming across the seas carrying hundreds of men armed for warfare on land, sea, or in the air; air liners roaring up through the Arctic between Europe and America.

These are no longer dreams of the far off future. They are

Flying the Lockheed seaplane above, Lindy again has struck out across the Atlantic, seeking an Arctic air route to Europe. Right—Outboard motor on strut of Lindbergh plane for forced landings.

Smiling Lindy does it again.

Wiley Post's Winnie Mae (above) whizzes around the world in a week. Map shows Lindy's exploration route to Greenland and 6,000 mile flight of Gen. Italo Balbo's twenty-four giant seaplanes from Italy to World's Fair at Chicago.

# of Father TIME

by WILLIAM J. KAY

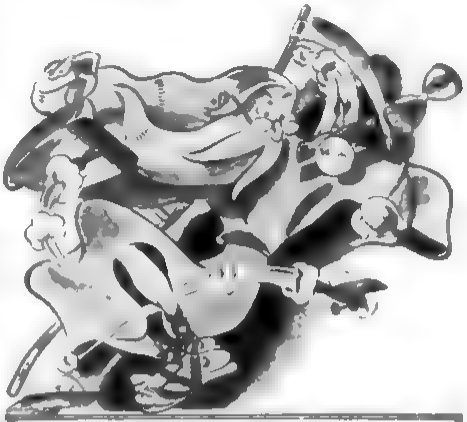
upon us now. So rapidly have records tumbled during the year that the whirling propellers of air pioneers confuse and startle staid old Father Time, almost clipping off his flowing white beard. The breeze of these flights has literally shrunk his shirt!

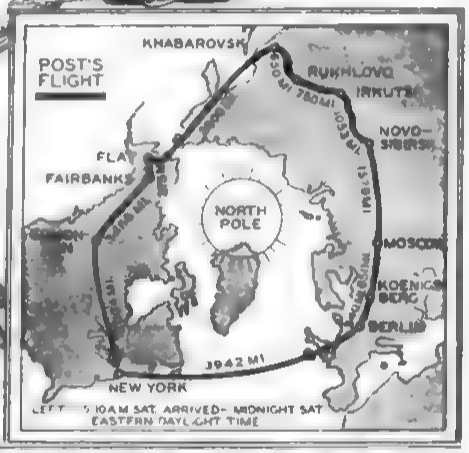
Balbo, Post and Lindbergh have written their names across the skies. With Mattern, Griffin, Hawks, the Mollisons and a host of others, they are in the van of pioneers of the air trying to cut time between this place and any other to somewhere near zero.

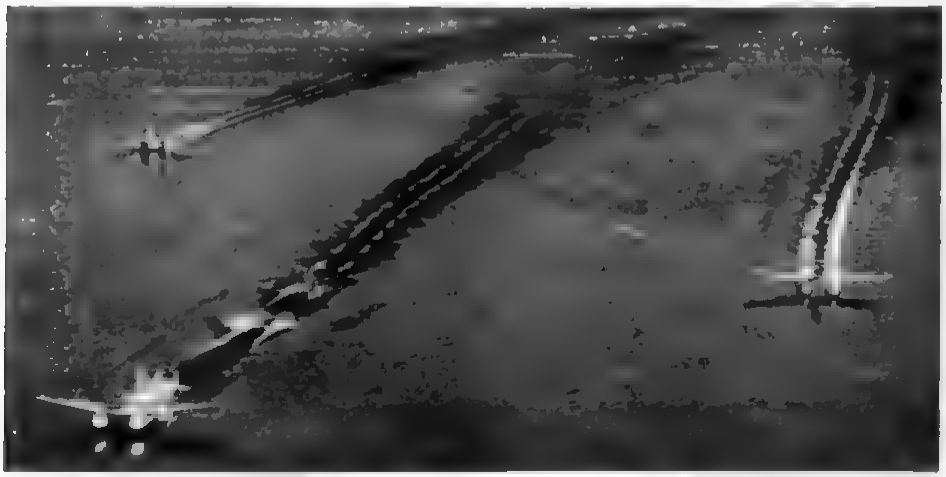
Only 24 years ago the world gasped when Louis Bleriot flew a frail craft 25 miles across the English channel from Calais, France, to Dover, England. And six years earlier the news was flashed to all points of the compass that Orville Wright had flown 120 feet!

In comparison glance at the following brief outline of 1933's aerial record.

Hardly had the *Winnie Mae* shot around the world in a week to break, not one,

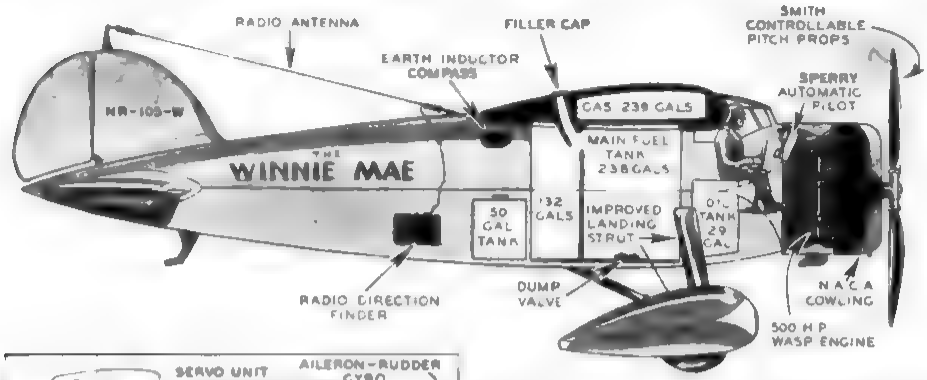


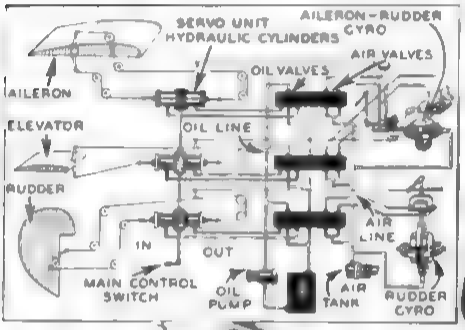




A triad of General Balbo's ships taking off from the water at Chicago. Above—Route of Wiley Post's earth-girdling flight.

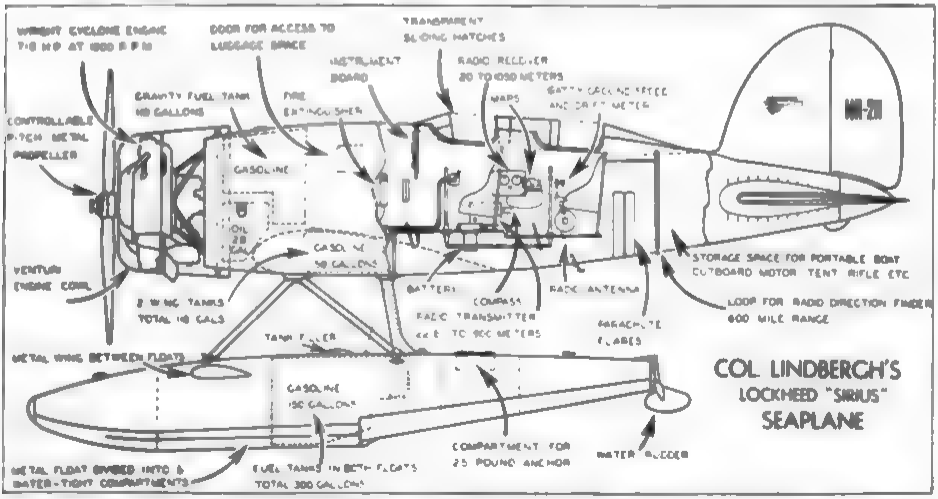
Details of the Post and Lindbergh Planes and Robot That Girdled Earth





Above—Long distance flight features of the Winnie Mae. Note secret army radio direction finder, controllable pitch propeller, automatic pilot. Left—How robot pilot works.

Two aerial pioneers, Wiley Post and Gen. Balbo. Left—New York to Syria plane of Maurice Rossi, Paul Codos.



Note the great fuel and storage capacity, controllable pitch propeller and direction finder in this diagram of the Lockheed seaplane Colonel and Mrs. Lindbergh flew into the arctic to survey land never before seen by airmen.

Balbo's Famous Military Armada Flew 11,000 Miles in Triad Formation

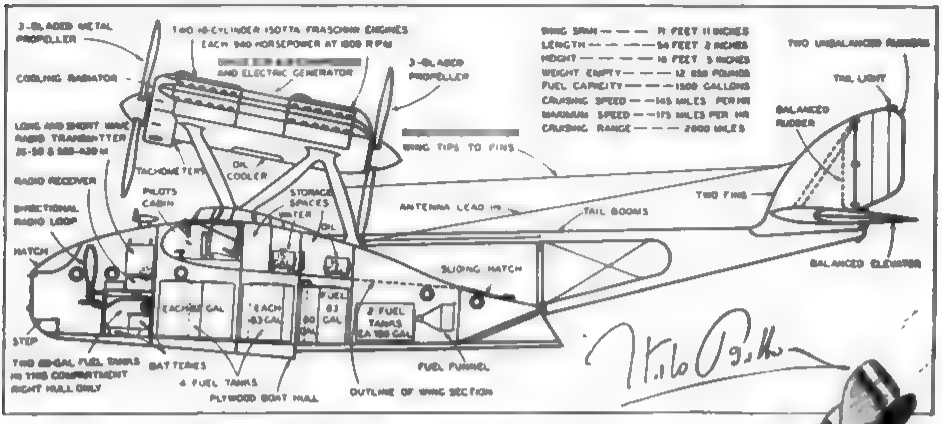


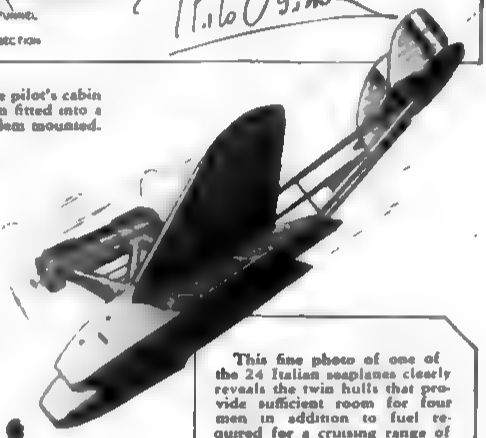
Diagram of Gen. Balbo's Savoia-Marchetti seaplane shows the pilot's cabin located in central wing section and the radio operator's cabin fitted into a forward compartment. Two 940-horsepower motors are tandem mounted.

but four records, when Wiley Post clambered out and talked of doing the same stunt in two days or less.

Gen. Italo Balbo's impressive squadron of 24 seaplanes, flying in perfect formation 11,000 miles across Europe and the Atlantic to the United States and back to Italy, painted for the world a vivid picture of future warfare, warfare that would regard distance as mere detail.

Almost passing Balbo and his fleet in the air, "We," Col. Charles A. Lindbergh

(Continued on page 16)



This fine photo of one of the 24 Italian seaplanes clearly reveals the twin hulls that provide sufficient room for four men in addition to fuel required for a cruising range of 2,800 miles. The 11,000-mile military flight from Italy to America and return was marred by only two accidents. A plane was wrecked and an aviator killed at Amsterdam. A similar upset happened at the Azores.

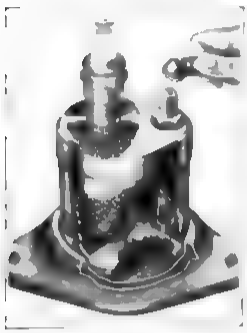
Just a partial view of the 300 barrels of fuel that were poured into the tanks of the Italian flying boats before leaving Chicago. The drawing at the left shows formation of Balbo's fleet, giving the name of each plane with the general's flag ship in the lead.

Dislikes Rowing; Builds Hand-driven Outboard Motor

HERE is a man who threw away his oars for a crank. Tired of rowing, a Texan inventor developed a device for propelling a boat by hand at a fair rate of speed. It consists of a two-handle crank, a flexible shaft, and a propeller. The flexible shaft runs in an S-shaped tube that is clamped to the stern of the rowboat. The crank is geared to give a high rate of speed to the flexible shaft and propeller.

Oars are eliminated with the hand-powered outboard motor shown here. Above is the entire device. The photo at the right shows how it is propelled. A flexible shaft runs through the S-shaped tube directly to the propeller. A high speed gear arrangement between the hand crank and the shaft propels the boat at a fair rate of speed while the operator's arms move comparatively slow. The photo shows how gadget attaches to stern of the rowboat for propulsion.

Forced Air Cleans Spark Plugs



A new spark plug cleaner.

COMPRESSED air to free spark plugs of oil and carbon is utilized in the device shown here.

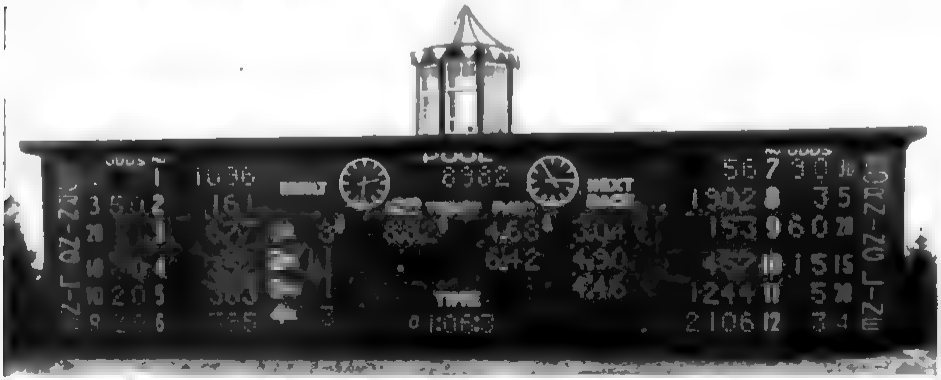
The manufacturers claim the air pressure not only cleans the points but the inside chamber as well. The forced air passes through a valve to a lower chamber where it is directed into the spark plug.

250 Miles of Cable Post Odds, Results and Winnings for Race Fans

AUTOMATICALLY computing the odds on each horse, the total amount of money played, and the prices paid on the winners, a new electrical scoreboard created a sensation at the Arlington Park race track near Chicago.

The machine, called a "Totalizer," does all but talk. It was constructed at a cost of a quarter million dollars after its inventor spent years perfecting it.

The picture below shows the many tasks the Totalizer performs. The "Morning Line" column of figures, odds on the horses hours before the race is run, is followed by a continually changing odds column until the final odds are posted in the third row. Each horse is designated by number instead of name and following this number is a figure showing how many $2 manual tickets were purchased on each horse. The center of the board gives the numbers of the winning horses, the prices paid, the total amount of money in the race pool, the time in which the race was run, the time of day, and the post time for the next race.



Within two minutes after a race is run this machine automatically calculates what prices are to be paid to holders of winning tickets at Arlington Park racetrack. Hundreds of electrical bulbs flash other information to the bettors.

Turn the Screw and Drive Your Auto on Railroad Tracks

TURN the screw and ride the rails! Quick conversion of an automobile for driving on railroad tracks is the purpose of the device shown in the photographs.

Replacing tires with special rims is entirely unnecessary with this latest invention. Its basic principle is the turnscrew which quickly lowers small guide wheels to the tracks. These wheels prevent the standard tires from slipping from the rails.

The rail converter is attached to the front end of the chassis. Another is fastened on the rear. The converters do not raise the tires from the rails as driving power is obtained from the rear wheels as usual. On rails, the auto requires no steering.

Turnscrew device quickly sets an automobile for riding on railroad tracks. Guide wheels do not lift tires from rails, the regular rear wheels furnishing the traction power as usual.

Tree Bark Imitated With Roller

A wood grainer intended not only to imitate grains of various woods, but also to reproduce tree bark surfaces, as shown.

IMITATION of tree barks or wood grains is simply done with the new contrivance illustrated.

It consists of two rollers mounted in a framework fixed to a handle. One of the rollers, grooved to form the markings of the bark or grain desired, comes in contact with a roller covered with a graining fluid. The graining roller has an engraved rubber surface which can be removed and substituted with another stencil.

Summer "Ice" Skates Invented

ICE skating during the summer without ice is made possible by a new sports invention. The skates look like ordinary winter skates, but the blade is fitted with rollers.

World's Record Set by Model Airplane; Stays Aloft Twenty-two Minutes

FOR twenty-two minutes a model airplane soared through the air to break all existing records for sustained flight.

The model plane is powered with a motor developing one-tenth horsepower. It was designed and built by Maxwell B. Bassett, of Oaklane, Philadelphia. Bassett's plane set the new world's record at the Natl. Championship Model Airplane contest.

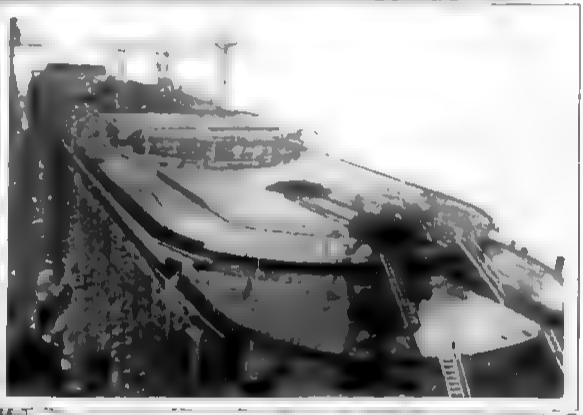
The chassis of the plane is simple. On it are mounted the motor, landing gear and rudder. The single wing is mounted considerably above the chassis. The ends of the wing are turned upward as shown.

The small mouse power motor is steam driven, developing one-tenth horse power for a sustained flight of several hours. A compressed air tube feeding into a gas burner heats the boiler, which is shielded against wind currents. Balsa wood braces the wings and also forms the fuselage of the plane, while heavy wire does duty as struts and landing gear.

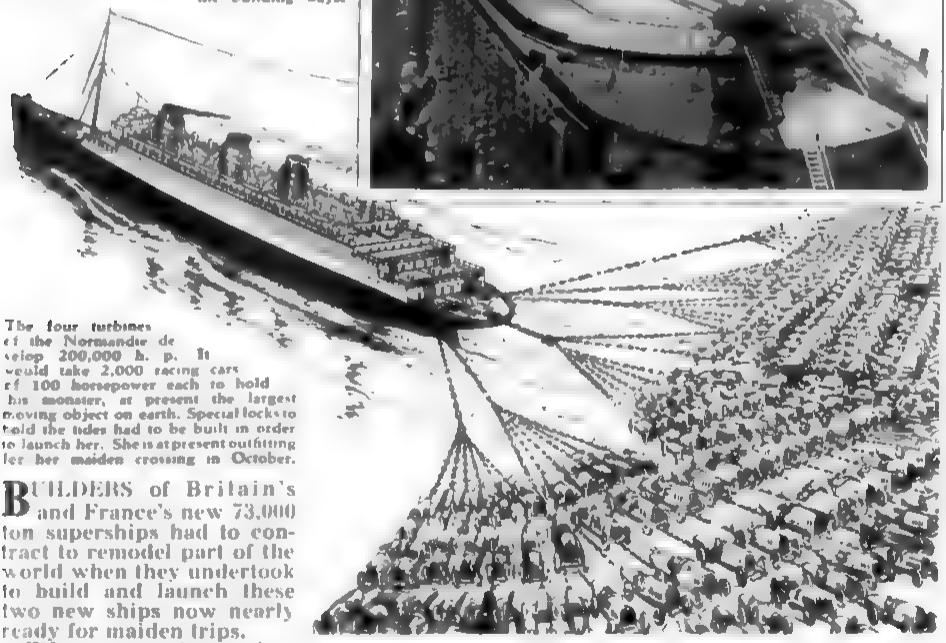
This photo shows model plane which remained aloft 22 minutes to set a new world's record for sustained flight.

World's New SUPER-Ships

Atlantic Mammoths now building for fall service have proved too big to launch without widening whole rivers.



So large that the Clyde must be deepened as well as widened to insure a safe launching, Britain's un-named "534" will take the plunge in October, this year. 100 feet longer than France's colossal "Normandie" (itself 50% larger than the Leviathan) this British 80 miler will cross the Atlantic in but four hours more time than the 20th Century could make it. Right: a view of "534" on the building ways.



The four turbines of the Normandie develop 200,000 h. p. It would take 2,000 racing cars of 100 horsepower each to hold this monster, at present the largest moving object on earth. Special locks to hold the tides had to be built in order to launch her. She is at present outfitting for her maiden crossing in October.

BUILDERS of Britain's and France's new 73,000 ton superships had to contract to remodel part of the world when they undertook to build and launch these two new ships now nearly ready for maiden trips.

Fifty per cent larger than the present monarch of the seas, the *Leviathan*, each of the new mammoths required an expenditure of nearly $10,000,000 for new channels, new docks, new launching methods.

The river Clyde had to be widened, the river Loire had to be widened. France had to dredge the ocean bottom to Havre to accommodate the new *Normandie*, whose dining room is large enough to hold the *Nina, Pinta and Santa Maria*—Columbus' whole fleet!

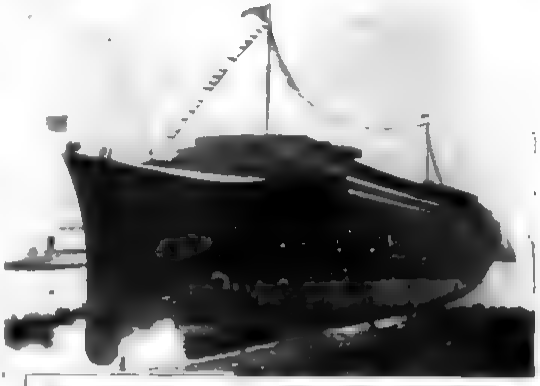
Beating her British rival to the launching, *Normandie* is outfitting at Havre for an early fall crossing of the Atlantic. Her speed will be 34.5 knots, or fifteen miles

Prove Too Big to LAUNCH

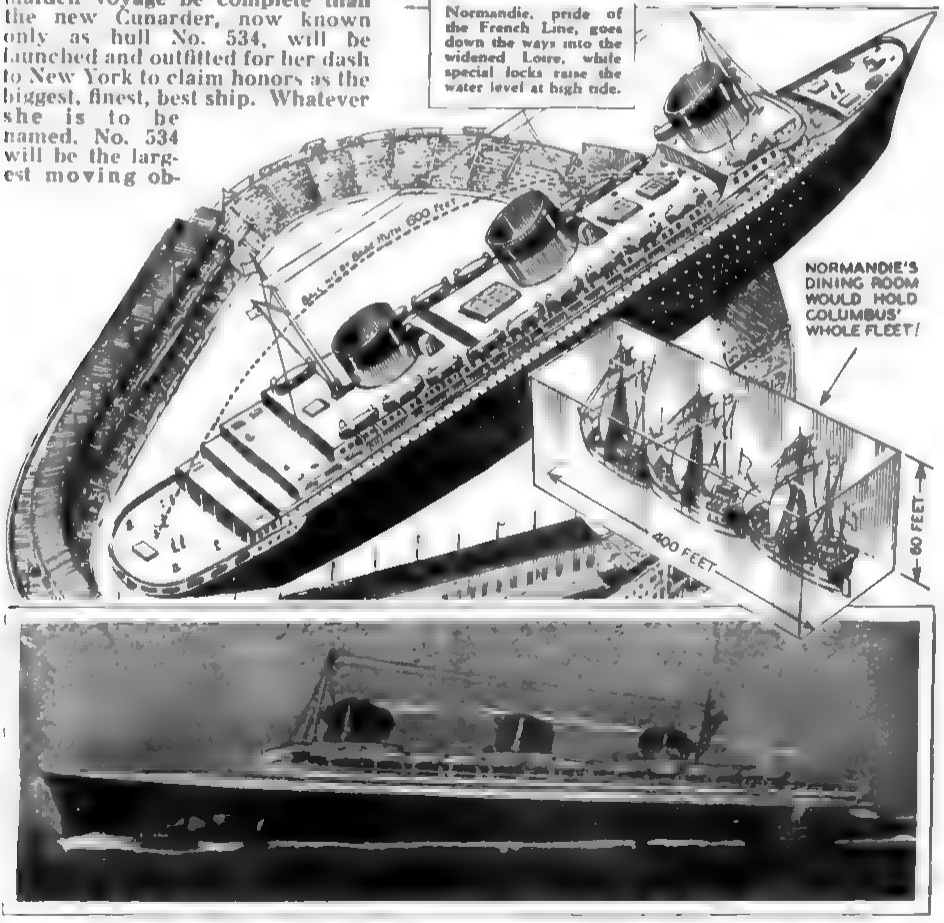
an hour faster than averaged by the ten best liners today. For a spell she will be queen of the seas.

She will cost complete $30,000,000. She is 1020 feet long, or about 200 feet longer than the *Leviathan*. She displaces half again as much water. Her four turbines develop 200,000 h.p. She has accommodations for 2,132 passengers. Her semi-bulbous bow and long whaleback deck are innovations to interest the mechanically minded, while the gourmet will be interested in the stress to be put on the cuisine. *Normandie's* 165 chefs and 400 waiters will serve an average of 10,000 meals a day.

No sooner will the *Normandie's* maiden voyage be complete than the new Cunarder, now known only as hull No. 534, will be launched and outfitted for her dash to New York to claim honors as the biggest, finest, best ship. Whatever she is to be named, No. 534 will be the largest moving ob-

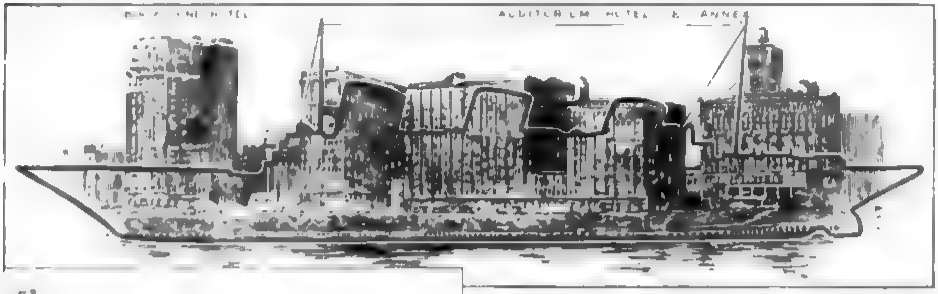


Normandie, pride of the French Line, goes down the ways into the widened Loire, while special locks raise the water level at high tide.



On a length of 1020 feet, and beam of 117.8 feet, the Normandie displaces 73,000 tons, or half again as much as the Leviathan. Placed in the Polo Grounds ball park she would reach 400 feet beyond Babe Ruth's longest home run. Columbus' whole fleet could be put into the Normandie's dining room.

Ninety Hour World Girdling Trips Possible in New Ocean Mammoths



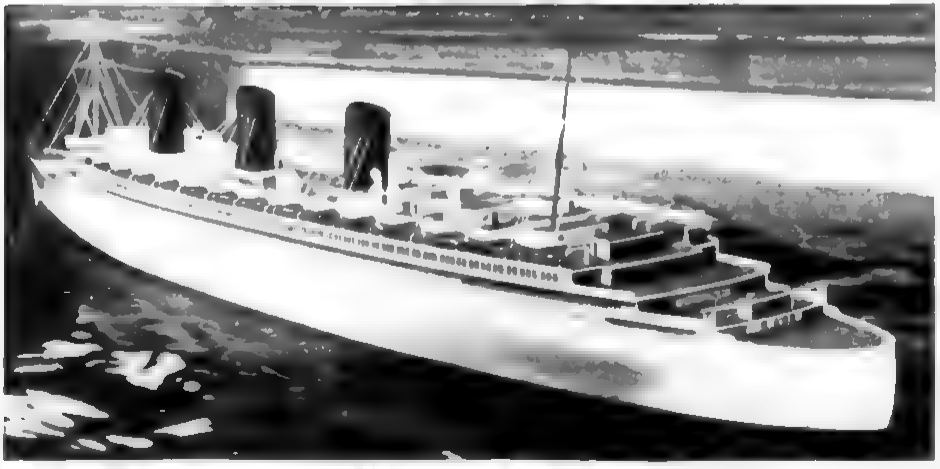
Until the 534 is named and fitted out, the Normandie will be the world's biggest ship. Here's what she'd look like if placed along the lakefront at Chicago, dwarfing buildings.

Bow of the Conte di Savoia showing the stabilizing machinery. At the right you see one of the huge gyroscopes that iron out the seas for these mammoth ocean ships. The latest conveniences invented by man are being installed in the new super-liners in the great international race to gain passenger acclaim and superiority on the high seas.

ject on earth. She will be 1120 feet long, will cost as much as the *Normandie*, will be a hundred feet longer and will weigh little more.

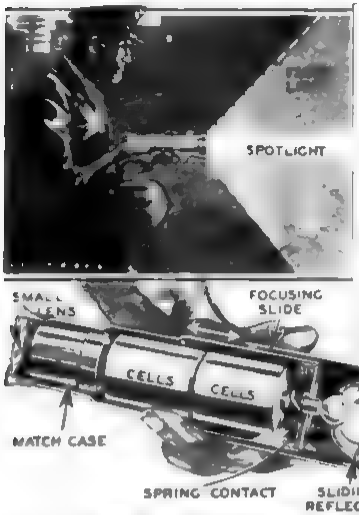
Her power of 200,000 horses and better will give her near-40 mile speed. She will be able to leave England with the 20th Century and arrive in New York but four hours later. She can circle the globe in 90 hours, but will never do it. Reason: Both No. 534 and *Normandie* are too big to go through either Suez or Panama. A world girdling tour would take these goliaths around Cape Horn.

Seventy thousand ton ships are needed, say engineers. Present sea queens *Mauretania* and *Aquitania* are 25 years old. They will be dwarfed by supership of France and England.



This exclusive photo shows the eighteen foot model of the 534 being towed in the testing tank upon the Clyde. She resembles very much the Empress of Britain, and shows typical British adequacy in the disposition of her enclosed promenades and decks.

Flashlight, 5 Power Telescope, Drinking Cup—All in One



A flashlight and telescope combined in one instrument is shown here. At the left is a cross section showing the lenses, batteries, and a drinking cup fitted into the barrel. The flashlight beam can be focused as shown on the left above.

IT'S a flashlight, but take out the batteries and it's a telescope.

The combination instrument, now on the market, has several uses for the camper. As a flashlight it has a focusing beam. The front lens can also be used as a sun glass to start fires, while the eyepiece is a good magnifying glass. Included in the tube with the batteries is a small drinking cup.

By removing the batteries, bulb, and drinking cup, the camper has a fair five-power telescope. The instrument is built to provide for an adjustable telescope for varying distances.

Windmill Recharges Batteries

A WINDMILL was ingeniously converted into a radio and auto battery recharger by a Nebraska farmer.

Living miles away from a service station or any electric lines, he devised the windmill recharger to do the work for himself and his neighbors at small cost.

The Windmill drives an old automobile generator. Wires, shown in the photograph, lead down to the battery post. An ammeter is placed in the line to indicate when the battery is sufficiently charged.

A windmill, old automobile generator, and an ammeter was all this Nebraska farmer needed to recharge batteries.

Prospector's Pan Gets More Gold

Scientific gold pan catches finest gold in a cup. A rubber squeegee forces coarser gold into the cup.

THE finest gold ore will not escape the prospector with a new scientific gold pan invented by George Jenison of Seattle, Wash.

The pan is made in two parts, the pan and a grizzly screen. When treated with mercury the pan catches all flour gold in a closed cup in center.

300 Watt Light in Modern Version of "Gilding the Lily"

Under glare of 300-watt light Victoria Regia, Amazon Lily, shown here, grows to five ft. diameter, attaining greater size in shorter time under treatment than without.

THE time-worn expression "gilding the lily" has at last found literal application (only in this case the application was made with paint).

The proprietor of a tropical fish and water plant nursery performed the feat upon one of his prize lilies, a Victoria Regia, a native of the Amazon River.

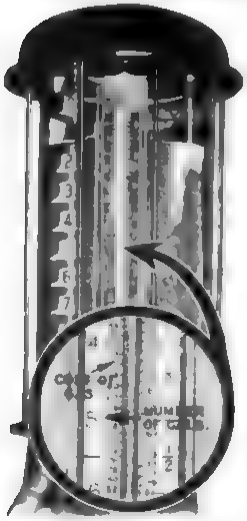
Over Victoria Regia he suspended a 300 watt light shedding 25 footcandles of illumination on the plant. The result of the amazing experiment was that the plant grew faster, larger and healthier than fellow pads.

The pads reached a diameter of 5 feet with fringes 3 to 8 in. high, and with surprisingly beautiful blooms.

Radio Bed Treats Rheumatism

A JERSEY City inventor has come out with a "radio wave bed" which he claims will cure a variety of ailments. By shooting short radio waves through the patient, vision is restored, rheumatic pains relieved, and blood circulation accelerated, it is claimed.

Gas Chart Tells Price at a Glance



Circle shows enlargement of pump chart showing gas price.

MANY filling stations throughout the country are sporting new charts on gasoline pumps which show the customer instantly the price of the gas he is buying. The chart, shown in photo at left, is graduated to compute the exact cost, and is held in position by a spring holder.

A different chart can be installed for each price of gas. Advantages of the chart are obvious—it saves time and enables the operator to fill the car tank and get correct pay without guessing.

Dentist Has Special Dog Clinic

THIS is the story of a dentist who has a deep love for dogs.

One day one of his canine friends (all the dogs in the neighborhood boasted friendship with the dentist) came to him whining pitifully.

So what did the dentist do but pick up his dog friend and carry him to his office, plop him down in his dentist's chair, put a bib around his neck, and proceed to fill the decayed bicuspid causing the agony.

The experience gave the dentist, Dr. Munson of Kildair, No. Dak., an idea. In a little room off his main office he set up a table and grinding equipment and now treats canine pets for dental troubles.

Dr. Munson treating one of his canine patients in his dental clinic for suffering pets. Dog's affection for dentist overcomes fear of treatment with the mysterious apparatus.

New Street Corner Radio Alarm Box Gets Police Quickly

POLICE broadcasting stations are unnecessary with a newly invented radio alarm box that will send emergency calls instantly to the nearest squad car and police or fire department station.

The instrument, intended to replace present street corner alarm boxes, eliminates the slower process of calling police headquarters where the alarm is turned over to the central radio station for transmission to cruising squad cars.

No central receiving office for police and fire alarms is needed as all stations and squad cars can be equipped with receivers tuned to the frequency of the alarm box signals.

Glenn W. Watson, of Detroit, is shown here with the radio alarm box he invented to speed emergency police calls.

Silk Washer Protects Hands

This washing device protects the hands from stains and from water when dyeing clothes or washing silk things. Its manufacturers claim it does not injure fabric.

WITHOUT wetting the hands fine silk things can be washed, and clothing dyed with washing paddles now being manufactured.

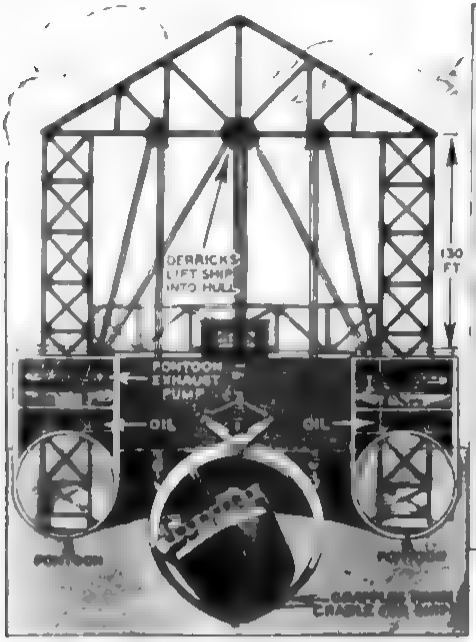
The washer does not break threads or injure fabric as it does not rub the material washed. It works with a gentle, rolling motion that cleans cloth.

New Bicycle Carries Bill Boards

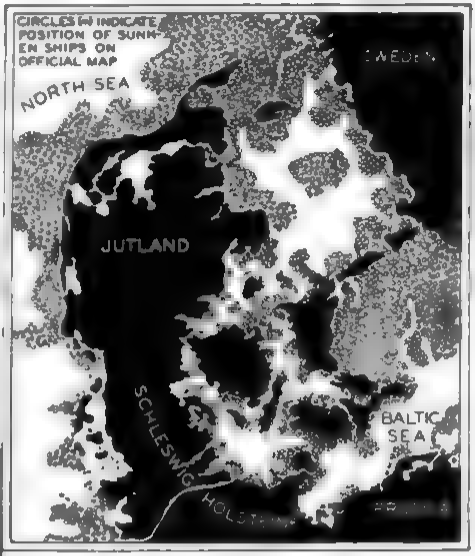
THE bill board bicycle, shown below, was constructed to provide cheaper street advertising than is possible with the auto.

The frame of the bill board bicycle shown here was elongated and the vehicle converted into tricycle to carry display boards.

Enormous Ice-tong Crane Lifts



Artist's drawing illustrates how huge derricks depending from the framework lift the sunken treasure ship up into the hull of the Byler vessel so salvage crew can set to work to recover gold, silver and other treasures from strong box.



Submarines, mines, storms, fogs have taken a heavy toll of ships plying the areas shown here. Byler project calls for a thorough combing of this region with his salvage ship

PROPOSALS to comb the ocean floor with the mammoth fingers of an amazing new salvage ship, to reclaim the billions of dollars in gold lying in the hulks of sunken ships, have been set forth as the latest and most startling depression remedy.

In the thousands of unreclaimed wrecks, from ancient treasure galleon to modern ocean greyhound, lies enough of the precious yellow metal to put the entire world on the gold standard, it is estimated.

With a view to recovering this enormous fortune, and thus setting the depression-stricken world back on the path to prosperity, Claude Byler, an ex-oil field worker, of Buffalo, Wyoming, is pushing plans towards the construction of the giant sea monster which lifts sunken vessels like an oysterman's rake lifts a bivalve.

Construction to Cost $1,000,000

Construction and operation of the gigantic gold digger are illustrated above. It is expected that building of the leviathan will employ 5,000 men and will cost, roughly, $1,000,000. Despite this exorbitant cost it is anticipated that the project will pay for itself in 90 days in salvaged gold, silver and other treasures now lying on the ocean floor.

Expert marine engineers, including Theodore E. Ferris, of New York, and George A. Sharp, who have checked the plans for the proposed salvaging ship, have pronounced them entirely feasible from an engineering standpoint, even though the contemplated size of the ship is 715 feet in length with 250 feet width and with a beam of 90 feet from the bottom of the pontoon to the upper deck, with the derricks towering 130 feet above deck to allow the tongs cradling the wrecks to be raised entirely out of the water.

Steel Fingers Lift 100,000 Tons

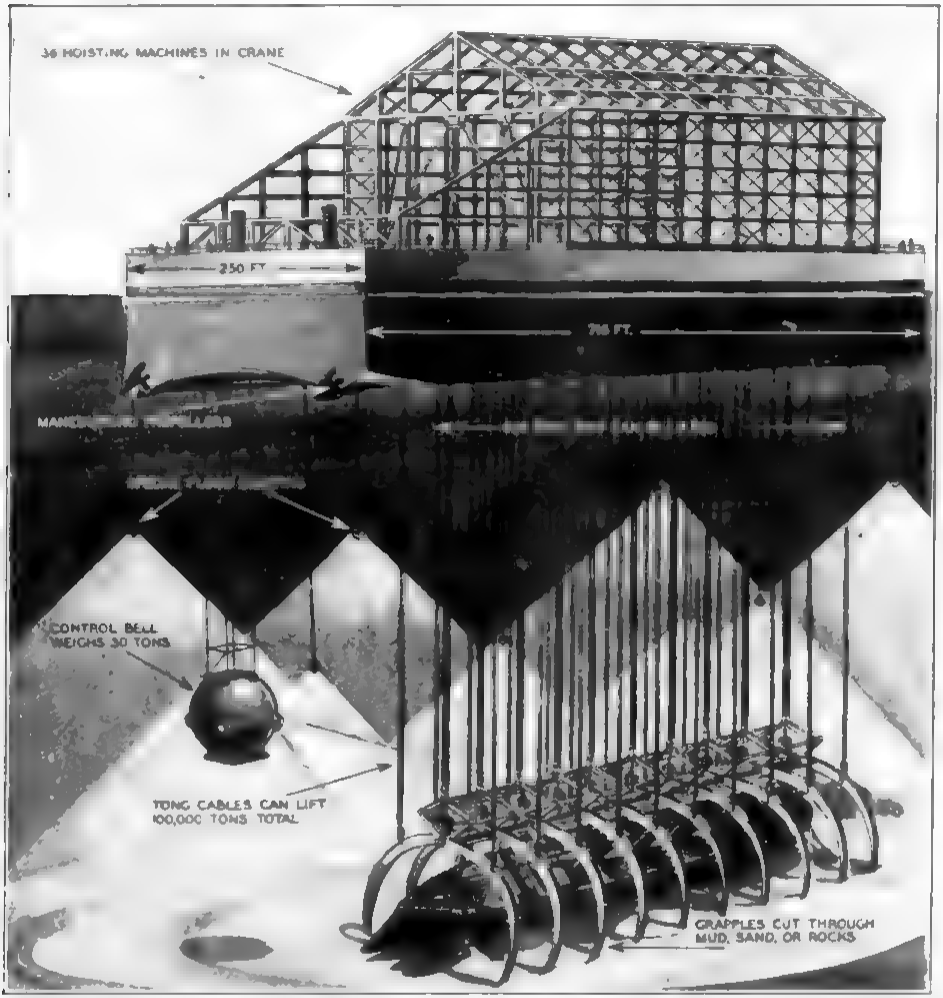
The ship will carry 25 feet of water empty and can be pulled down to 90 feet. No wreck at the bottom now, however, will do this as the weight of none exceeds 48,000 tons.

The tongs of the salvaging pontoon ship carry out an entirely new idea in construction as the more weight that is placed on them, the more they will lift their points up instead of down due to their weight and the high pressure air coming out at the point.

These mighty fingers of steel will claw through several hundred feet of mud and sand to bedrock in search of wrecked ships. The big pontoon will be used for air tanks and will carry 1000 pounds to be used in the tongs to blow the sand and mud away when starting a wreck off bottom.

The eye or control ball, weighing 30 tons, will be attached to the ship with four cables and will carry five men. Air will

Bullion Wrecks from Sea Bed



Here is illustrated the operation of the Byler salvage ship. When sunken hulk is located from control bell, grapples descend over wreck, close upon it to form a cradle, and lift the hulk, regardless of its condition, into hull of salvage ship.

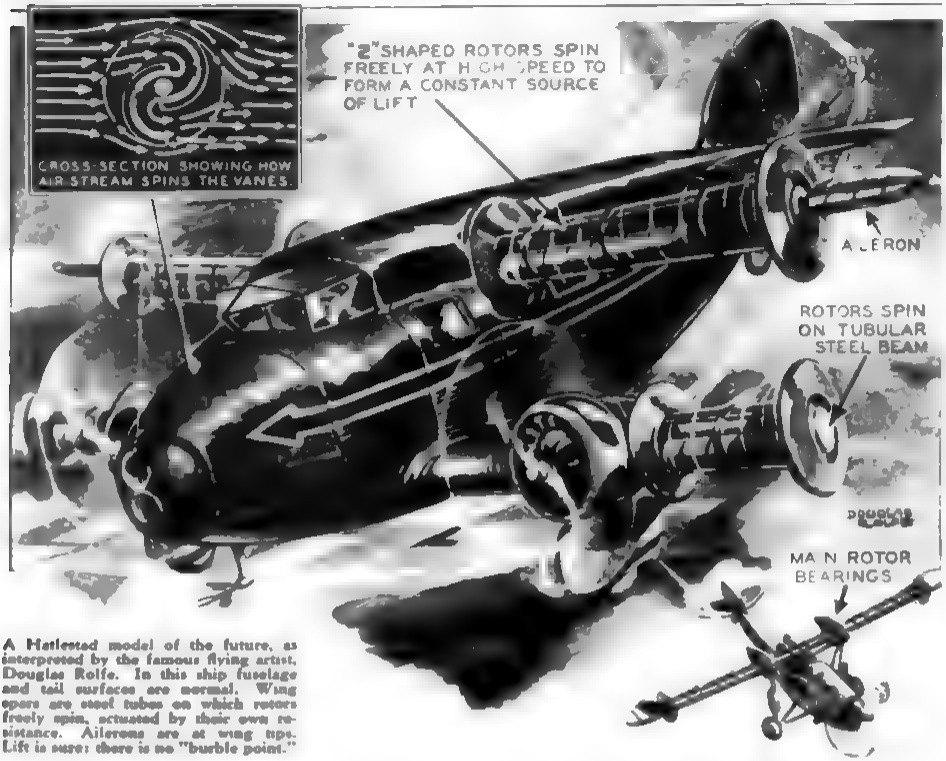
be forced into the ball through one cable and out through another. The other cables will carry light and telephone wires so that the men can stay down as long as desired without discomfort.

Through a new lighting system worked out by the inventor, some 6,000,000 candle power will be used through powerful search lights, thus enabling the engineers not only to locate wrecks, but also to place the tongs properly over the objects to be salvaged.

It is anticipated that with the pontoon salvager a wreck can be lifted 3,000 feet in twelve hours. The tongs will not take hold of the wreck but will slip under it, cradling it, so that old wooden ships and craft belonging to sea pirates can be salvaged without tearing them to pieces.

Instead of sending men down into the wrecks in search for buried treasure at great risk of limb and life, as is chiefly the case now in salvage work, Byler's ship, through a system of thirty-six hoisting machines carrying ten thousand feet of cable, will manipulate twenty-four sets of ponderous tongs or grapplers that are large enough to cradle any wreck of the largest type and to draw it up into a 600 ft. well in the hull of the ship where it can be salvaged.

M-M Reader INVENTS



A Hatlestad model of the future, as interpreted by the famous flying artist, Douglas Rolfe. In this ship fuselage and tail surfaces are normal. Wing spars are steel tubes on which rotors freely spin, actuated by their own resistance. Ailerons are at wing tips. Lift is sure: there is no "burble point."

Evolving a rotor winged model suggested by a Modern Mechanix and Inventions cover painting, 16-year-old Harold Hatlestad hit upon a revolutionary principle as the happy result of his ingenuity and an accident. The Hatlestad rotor plane flies, and cannot spin.

INTELLIGENT, enterprising Harold Hatlestad, 16-year-old Minneapolis aviation enthusiast, one day made his way to the Hatlestad front lawn bearing a model plane with wings resembling panatela cigars. The queer looking "what-is-it" was inspired by the design of a rotor-winged fighting plane depicted on a recent cover of this magazine.

Normal in every way except wings, the Hatlestad model was unique in that, partly by design, partly by accident of necessity, modeler Hatlestad had slipped the two cylindrical halves of an ordinary Flettner rotor (which requires external power to spin for lift) until in cross section the Hatlestad rotor resembled the letter "S."

First Rotor Ship Flight Made by Boy

Stooping on the Hatlestad lawn, Harold wound the rubber strands of the model, let loose, cried with delight, "It Flies!" Buoyant flight, remarkable duration, unbelievable stability, absolute non-spinning characteristics were immediately evident.

Taking the model under-arm to Professor John Akerman, head of the aeronautical engineering department, Harold plunked the model down on the Professor's desk, asking, "Is this thing any good?"

After impromptu tests on the university campus, enthusiastic, experienced Professor Akerman (designer of the Hamilton mailplanes and other noted ships) said, "—a completely new method of sustentation—so original that it will be of worthwhile importance to the aviation world."

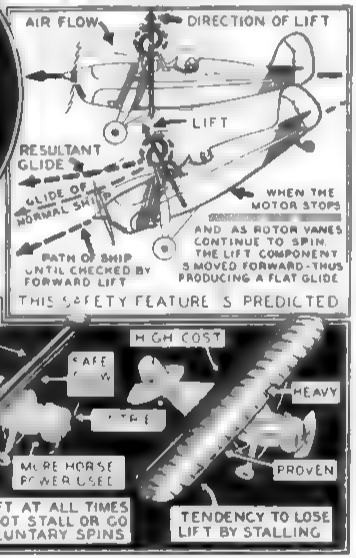
Thus was the first practical rotor design evolved by 16-year-old MODERN MECHANIX AND INVENTIONS reader, Harold Hatlestad. So much for news.

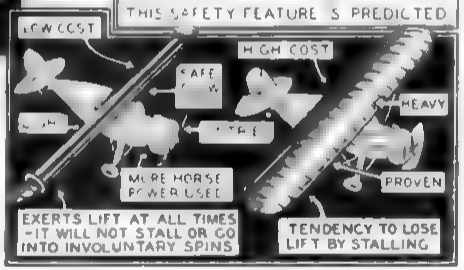
Constantly searching for complete safety in airplanes, of late engineers have turned

Revolutionary ROTOR

Top drawing shows how a normal wing exerts lift. If angle is too steep, lift ceases, plane stalls. Lower drawing shows how rapidly rotated cylinders will reproduce air foil lift. This type of rotor requires power to spin it; Hatlestad rotor spins self. Right: Hatlestad holding copy of Modern Mechanix and Inventions, his favorite informer on things airwise and mechanical.

The original Hatlestad rotor plane which eminent engineers claim proves a theory which will revolutionize flight.





Why a Hatlestad rotor cannot stall: "S" rotor vanes spin at all times, giving lift. Even when sinking vertically there is great forward component, making ship have long glide characteristics. Cannot spin.

attention to an amazing extent toward new supporting surfaces.

The Cierva Autogyro, dubbed the "Flying Palm Tree" by funmakers, has been most promising in affording non-stalling, non-spinning, fool-proof flight.

Much work has further been done on ordinary airfoils themselves, many improvements made such as slotted wings.

All these new ideas are daily proving that the future of the airplane is not necessarily irrevocably linked with customary wings or supporting surfaces.

Characteristics of New Design

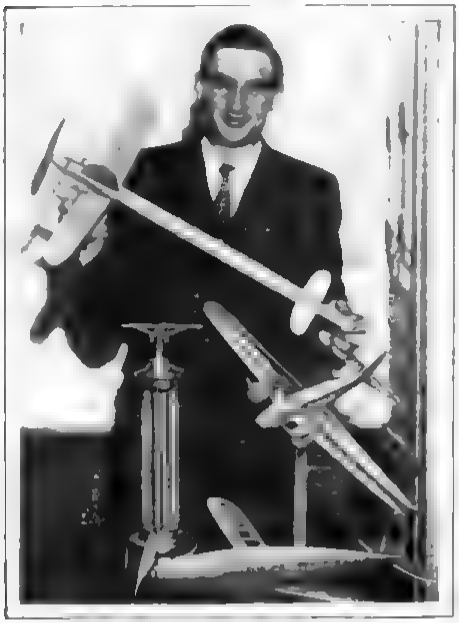
Such were the thoughts in Harold Hatlestad's topper when he started a model rotor plane to see if Flettner's rotor principle could be made to support a flying body. Flettner's rotor is round, obtains its lift like a spinning baseball thrust sideways in a curve-toss. Reasoned Hatlestad: "Why not separate the two halves and make them turn themselves by the rush of wind instead of putting in the paraphernalia to give these round tubes their lift. Can't hurt to try it."

Thus the shout of glee, "It Flies!" when the stumbled-on expedient proved a winner.

It is expected of the Hatlestad plane that: (1) It will be able to fly as slowly as an autogyro; (2) Stalling and spinning, twin bugbears of the airplane, will be impossible under any circumstances.

With applications for patent papers already completed and with prospects for full size construction in the immediate future, the aviation world is likely to see some startling developments with a type of supporting surface that combines safety features with low cost—two much needed features. Hail Hatlestad!

Model Plane Speeds 66 Miles an Hour for New Record



The model airplane that set a new world's speed record of 66 2/3 miles an hour is shown in the hands of its builder, Robert Pekelsma. The photo also shows trophies he won.

WHIRLING through the air at a speed of 66 2/3 miles an hour, a model airplane established a new world's record during he American Model Airplane tournament.

In addition to the world's record, the model racing plane captured the grand prize of the tournament and the national model airplane championship for 1933.

The plane was built by a Chicago boy, Robert Pekelsma, and was the sensation of the national tournament held at the Municipal Airport in Chicago. The plane consists of a round chassis encasing the rubber band motor, monoplane wings, fixed forward rudder, and rear stabilizer.

Flying Warship Has Gun Turret

ARMORED gun turrets for England's new high speed night bombing airplanes have been designed to meet attacks from enemy aircraft flying below.

The bombers are veritable flying battleships. The gun turrets may be withdrawn when not in use. Turret provides sufficient room for the gunner and a machine gun.

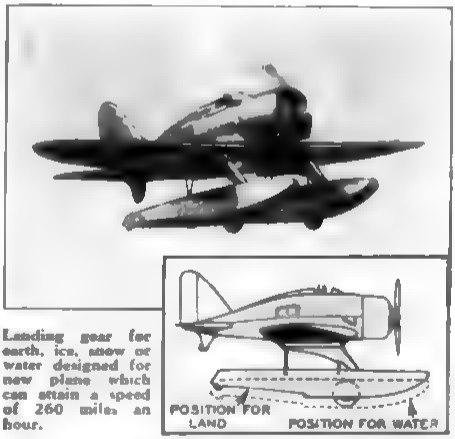
The gun turret, invented for England's latest bombers, prevents attack from below. It swings at any angle.

Work 50 Years to Make U. S. Map

FIFTY years of labor has produced a new geologic map of the United States, showing the country's vast buried mineral treasures.

The map was the work of the U. S. Geologic Survey department. It shows more than 160 units of rocks in 23 different color patterns. The survey revealed deposits of berryllium, a valuable metal used as an alloy, in the Rockies, Black Hills, and Atlantic Coast mountains.

Plane Built For All Landings



Landing gear for earth, ice, snow or water designed for new plane which can attain a speed of 260 miles an hour.

A SINGLE landing gear for earth, ice, snow or water is the latest equipment of a new high speed low-wing amphibian.

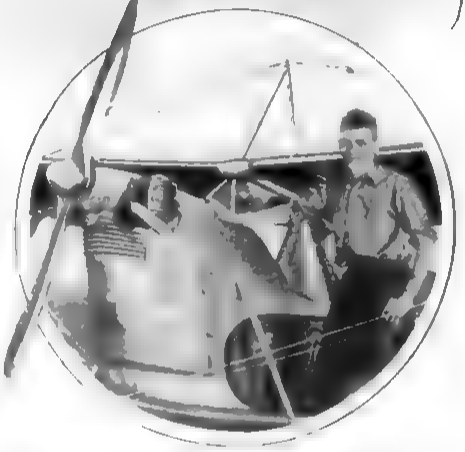
Operation of the landing gear is shown in the drawing above. The position for water is the same as used on ice or snow.

The plane was built for Major Alexander P. De Seversky, Russian World War ace, now in the United States.

The amphibian, built for long distance speed races, is practically a flying gas tank. Its top speed is 260 miles an hour. The major's wife acts as co-pilot, just as Mrs. Lindbergh does for the famous "Lindy."

Young Flier Crosses U. S. on Thrill Jaunt

At right—Dave Meeker winging over the countryside in his Aeronca which flew him from the Atlantic to the Pacific. Left—The ingenious drift indicator which Meeker designed for his trip.



Dave Meeker standing proudly beside his faithful Aeronca —but who wouldn't be proud after battling storms, fog, desert heat, and dozens of other hazards to make a coast-to-coast hop—a real aeronautical feat for a 20-year-old lad.

EVERY M-M light plane fan who ever built himself a proud little air bus either in imagination or in reality has dreamed of a carefree aerial jaunt from coast to coast, from border to border—anywhere the adventure will-o'-the-wisp might lead.

But it remained for Dave Meeker, a twenty-year-old aviation fan who has been poring over plane blueprints ever since he can remember, to convert his dream into a reality. And how he made his thrilling flight, alone, from New York to San Diego, in a two-cylinder four hundred-pound ship, at a total outlay of $50, makes a story that you fellow aviation bugs will hearken to with outstretched ears.

David Meeker's folks didn't like the idea of his flying away from home, let alone think about going to the Pacific coast. It wasn't so bad to have him crow-hopping from a nearby landing pasture, but to fly from Pittsburgh to San Diego was ridiculous.

Dave Determined to Fly

But Dave had his own ideas about the matter. He remembered only too well how his mother had destroyed his first self-made glider, when he was twelve. Then his dad, H. A. Meeker, had used diplomacy on Dave's mother, so that the youth was allowed to make an experimental hop to New York. This jaunt was a thriller in itself, and it wised Dave up to a lot of points on long-distance flying.

Returning to Pittsburgh after the hop Dave had several long talks with his parents. After finally securing permission, especially from his mother, for she had been hard to convince from the first, he made ready for the big moment of his life.

Two things had to be done; first the lightening of the ship, then its outfitting for its gruelling task. The battery and generator were removed and parked on a shelf in the barn. To his regular motor instruments on the dial board Dave added his self-designed drift indicator, a combination inclinometer and level, an altimeter and a compass. This compass was also his own creation, and in its lightened size was admirable for his use.

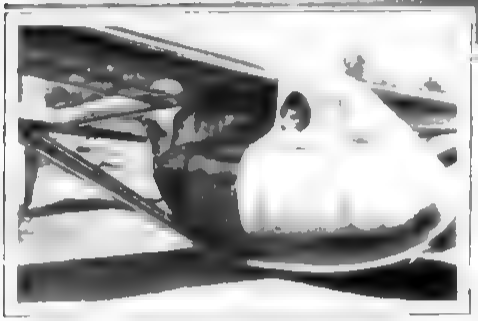
Over the aluminum seat rest he folded the tan canvas tarp which was his cockpit cover, upon which he would sit. Packed in at the side were a gallon of oil, two gallons of gas, a quart of drinking water and maps of the route. As a last-minute precaution he included a valve spring, for once in the Alleghany Mountains he had been caught unprepared.

Although these preparations were thorough, they were nevertheless a little hurried, for Dave was fearful that his mother might change her mind and confiscate his plane altogether, just as she had done his glider.

(Continued on page 28)

3-Glider Towing Feat Heralds Day of Plane Locomotive

America's first sky train, forerunner of future aerial freight trains, is shown above rising from the Grand Central Airport in Los Angeles. The three "cars" hooked to the transport plane "locomotive" are motorless ships. The gliders were cut loose at various destinations to show the possibility of landing freight "cars" at cities on an air transport route.



A closeup of one of the glider "cars" of America's first sky train. In the forward cockpit can be seen Harry Bowlus, designer of two of the gliders and pilot of one of the "cars."

No Landing Gear on Speed Plane

LANDING gear reduced to an absolute minimum has been designed to increase the speed of a foreign racing airplane.

The picture below reveals how ordinary struts and wheels of an airplane landing gear have been entirely eliminated. The ship takes off and lands with the aid of only one wheel, plane skids and a tail skid.

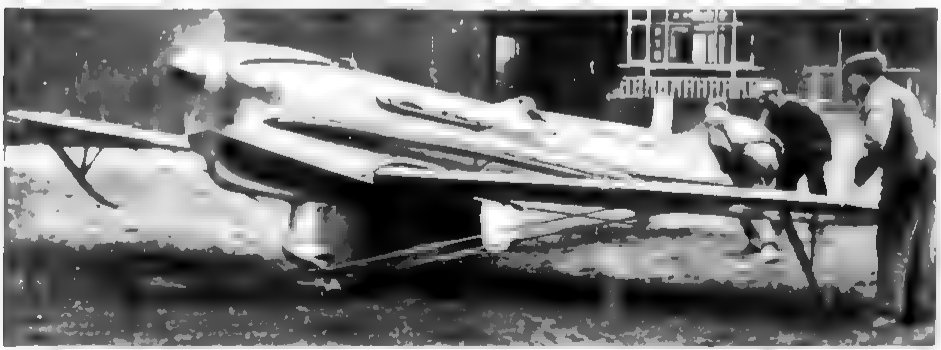
All are retractable when the ship is in flight, thereby reducing air resistance as greatly as possible. The plane is shown about to take off.

OPERATING aerial express trains that can cut loose "cars" to land at any city along a transport route became a possibility of the near future following an actual demonstration in Los Angeles.

Fully developed, the air freight train could greatly reduce the cost of shipping merchandise and mail by air. The aerial trains would consist of a string of baggage or freight "cars" towed by high powered passenger planes acting as locomotives. The "cars" used in the experiment were motorless gliders.

As the destination of freight in each "car" is reached the "brakeman" pilot could cut loose from the train and glide to the airport of the city, where the freight, baggage or mail could be quickly distributed. Should it be necessary for the entire train to land each glider would cut loose and land near the "locomotive."

America's first sky train consisting of a transport plane "engine" and three glider "cars" is shown in the picture above.



Landing gear was eliminated on this foreign racing airplane to reduce air resistance to a minimum. The ship takes off and lands on one wheel, plane and tail skids. All are retractable when plane is in air to further reduce air resistance.

X-ray Photos Find Girl With Perfect Back at Health Show

THE X-ray was the final judge in selecting the girl with the most perfect back at California's health show in Los Angeles.

After examining X-ray photographs of all the girls entered in the contest, Dr. Lester V. Donovan picked Miss Judith Allen, young movie actress, as the winner. An X-ray of Miss Allen's back showed a spine in perfect alignment, unmarred by any curvature.

The young lady hails from Boston and is said to have a promising film career ahead. The photo at the right shows attractive Miss Allen and the remarkable X-ray picture held by Dr. Donovan.

This X-ray photo proved that Miss Judith Allen, young screen actress, had the most perfect back in a contest conducted at California's health show. Dr. Lester V Donovan is holding the X-ray picture of Miss Allen's back.

Fountain Brush Sprays Teeth

A FOUNTAIN toothbrush, which forces a liquid carbonic spray through the bristles, thoroughly cleans the teeth and acts as an atomizer at the same time.

The flow of the liquid is controlled by pressing a lever on the container holding enough cleaning fluid for a month. The device is a Norwegian invention.

This fountain toothbrush cleans teeth by spraying cleaning fluid from the container through the bristles to the teeth. The flow of the liquid is controlled by lever on container.

Cosmic Shove Keeps Earth Going

A MYSTERIOUS "cosmic force" gives the earth a shove now and then to keep it spinning, it is believed.

The unknown power, which may be the cause of earthquakes, was described at the recent International Geological Congress in Washington. Dr. Arnold Heim, Swiss geologist, declared that the force may come from a planet or some body that passes near the earth at intervals.

He pointed out that the speed of the earth's rotation slowed down from 1650 to 1700, speeded up again until 1900, and now is slowing down. The "push" is believed to have built mountains and changed positions of the earth's poles in the past.

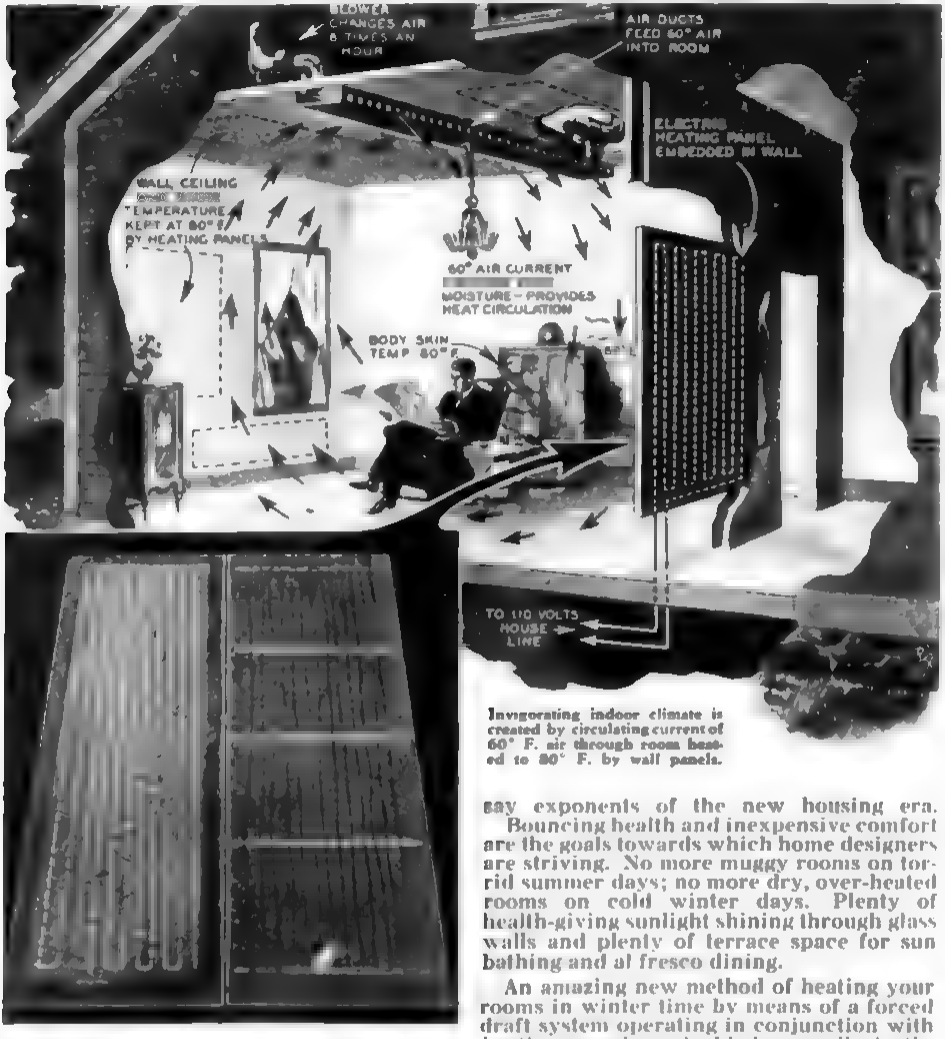
Boys Build Oil Barrel Locomotive

A HOME-MADE locomotive, built by two 14-year-old boys from an old oil barrel, parts of a coaster wagon, bicycle sprocket and washing machine gear, startled residents as it whistled and chugged its way through the streets of Minneapolis.

The builders of the one-half horsepower steam engine are Marlon Nelson and Robert Wass. In the oil barrel they installed a small boiler coil and cut a door for a fire box. An old coal hod and a piece of stove pipe finished the boiler. The frame was made from an old iron bed.

Two Minneapolis boys built this half horsepower locomotive. Above—Closeup view of the bicycle chain drive.

Ultra-Modern Homes Promise



Invigorating indoor climate is created by circulating current of 60° F. air through room heated to 80° F. by wall panels.

80° F. heat is radiated into the room from panels of this type embedded in walls, floor and ceiling, as shown. Dotted lines show position of wires when covered by plaster.

A NEW architectural age is dawning! Proof of this is seen in the strange new types of homes which are springing up throughout the country, presaging the day when we will be living literally in glass houses.

Our faithful old wooden and stone dwellings are primitive and unscientific, not so very far removed, so far as comfort and convenience is concerned, from the caves in which our half-human ancestors dwelt, say exponents of the new housing era.

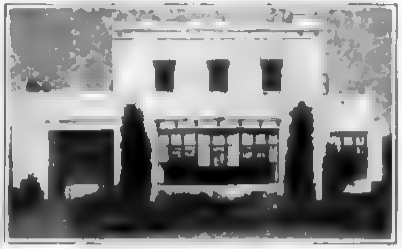
Bouncing health and inexpensive comfort are the goals towards which home designers are striving. No more muggy rooms on torrid summer days; no more dry, over-heated rooms on cold winter days. Plenty of health-giving sunlight shining through glass walls and plenty of terrace space for sun bathing and al fresco dining.

An amazing new method of heating your rooms in winter time by means of a forced draft system operating in conjunction with heating panels embedded in walls is the contribution of heating and ventilating engineers to increased home comfort.

As illustrated in an accompanying drawing, the walls, floor and ceiling of the rooms are kept at a temperature of 80 degrees F. by the wall heating panels. In the ceiling, a row of air ducts circulates through the room a current of air cooled to 60 degrees F.

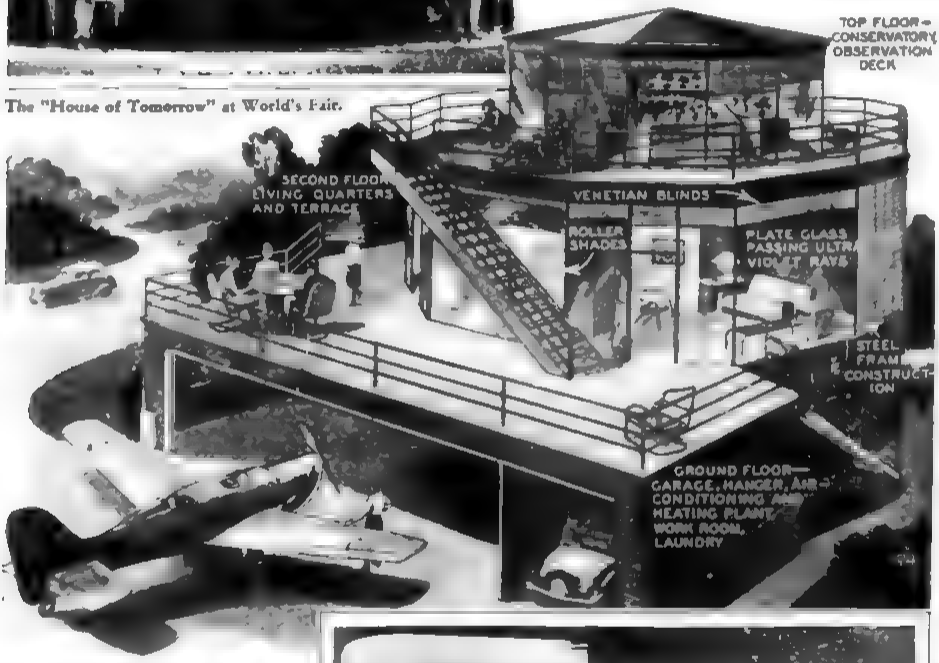
Now bodily health and comfort demand that the heat generated by the ordinary processes of life be dissipated. With the wall temperature kept at 80 degrees F., this dissipation is prevented, so it remains for

Better Health and Comfort



Sheet steel walls welded to steel girder frame replace wood and stone in this ultra-modern home.

The "House of Tomorrow" at World's Fair.



Artist's drawing shows outstanding features of the "House of Tomorrow."

convection and moisture evaporation to relieve the body of its excess heat.

Experiments showed that with 80 degree walls and 60 degree air current circulating through the room, the artificial climate is very invigorating and productive of the last word in comfort.

Contributions of architects to home convenience amounts to a wholesale scrapping of all our cherished housing ideas. The

(Continued on page 31)

Though fantastic in design, this modernistic home of glass and steel greatly surpasses conventional homes in comfort and healthfulness. Note the deck-like platform which does duty as a front yard. Flood of sunlight for illumination enters through the ample windows, bettering health and cutting light bills. Photo courtesy Howe and Lescaze, Architects, New York City.

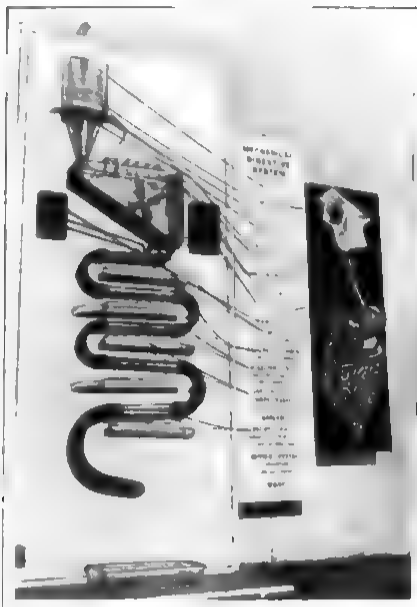
Scientific HIGHLIGHTS of

It looks like the Chicago Fair were built especially for M-M fans. It is replete with the kind of mechanical wonders shown here.

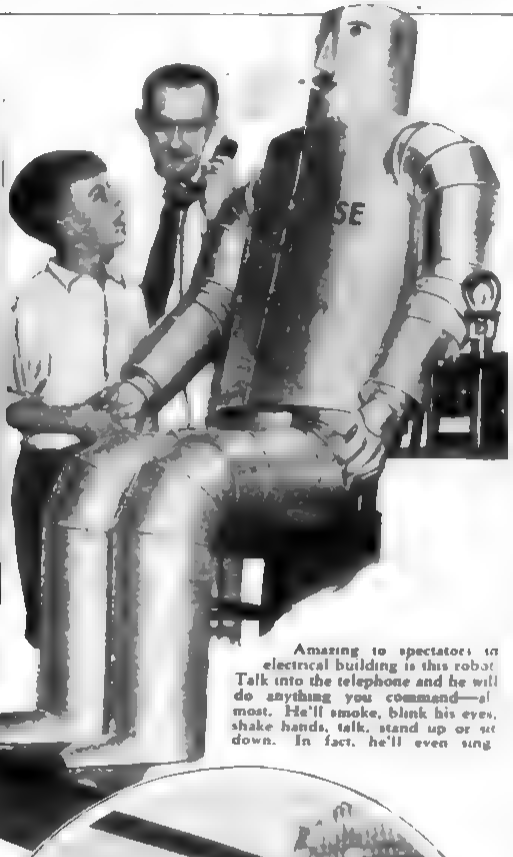
While you're casually viewing this display of priceless jewels an armed guard is watching your every move. If glass is broken, tray drops into vault.

If, when visiting the Fair, you're curious as to the temperature at the moment, all you have to do is glance around the horizon and this world's largest thermometer is sure to come within your view to tell you what you want to know. A series of Neon tubes does duty as a column of mercury, the height being controlled by a master thermometer at the base. The figures and graduations are also outlined by glowing tubes

Chicago's WORLD FAIR



Ever wonder what happens to the food you eat? This intriguing exhibit in Hall of Science illustrates while you wait the digestive processes that go on right in your own innards.



Amazing to spectators in electrical building is this robot. Talk into the telephone and he will do anything you command—almost. He'll smoke, blink his eyes, shake hands, talk, stand up or sit down. In fact, he'll even sing

Motordrome at Fair is attracting thousands, who watch this daring young Miss circle the drome at breath-taking speed with full grown lion riding beside her in the car.

You can have a $20 bill free for the taking at this exhibit—providing [illegible] take it without rousing out the guards. Your success depends upon ability to get beyond electric eye beam.

Latest Inventions Modernize

ELECTRIC FAN CABINET

Air is distributed evenly throughout room by cabinet fitting over electric fan. Cabinet is made of metal with fine screen mesh in front to act as a safety guard. Fits any fan.

COAL PULVERIZER FOR FURNACE

Maximum heat is extracted from coal by this new pulverizing mill which blows powdered coal into furnace like jet of gas. From the hopper, holding week's supply, slack coal is conveyed to grinding mill, and thence, powdered, to blower. Thermostat and pressurestat control operation, saving many dollars in fuel

Coffee available in compressed tablet form eliminates messiness. Each cake is divided into four segments, each of which is the proper size for a cup of coffee. Corn syrup cements the coffee grounds together.

GAS GENERATOR

Heat, light and refrigeration is furnished to most remote farmhouse by new home gas generator. Storage battery or home lighting plant operates low H.P. motor. Fuel tank of any desired size is installed three feet underground, storage tank in basement, while pipes connect with any type gas stove. Automatic switch keeps tank always full of gas, which thus flows always steady and continuous. How generator is connected to gas stove is illustrated above.

the Old Fashioned Home

Ingenious little ice tongs just placed on the market make it unnecessary to use your hands in handling ice cubes. Pressing stem with thumb opens tongs to grip or release ice cube. Device is attractively finished.

This home weather making machine is so automatic that turning dial of radio-like cabinet (at right) produces any kind of weather desired. It cools in summer, heats in winter, controls humidity, purifies and circulates air the year round. Installed in basement, with a control cabinet in every room.

Instantaneous cooling of beer is accomplished in this new ly patented device that carries beer in coils through a liquid cooling medium. Device is hooked between beer barrel and faucet, and temperature of beer leaving faucet can be controlled to any degree.

With this new mechanical sock darner the housewife can mend her husband's footwear in few minutes. Set of hooks in the instrument raise the edges of the hole, making it easy to pass the needle through. A ring holds sock firmly in place during darning procedure.

Where are America's Cup Contenders Today?

THE HIGH COST OF YACHTING

Yachting's premier sporting event, defense of the America's Cup, has called for the expenditure of well over ten million dollars in highly temperamental and costly craft since the schooner America annexed a homely old hundred guinea mug in a race around the Isle of Wight eighty years ago.

Sir Thomas Lipton, grand [redacted] built five challengers in a thirty-year attempt to beat United States yachts. Each of these challengers and defenders has run the cycle from building and outfitting to the glory of full sailed maturity in about five years. Now practically all are being broken up for the materials.

The cost of nursing a cup contender through infancy, adolescence, full sailed maturity, to old age and final break up averages $250,000.

Shamrock, Sir Thomas Lipton's contender for yachting's premier cup, is being broken up.

Only King George's 40 year old Brittania, with an Empire footing the bills, carries on.

A Radio on Your Bicycle Makes Riding a Pleasure Trip

PUT a radio on your bicycle and enjoy your favorite programs while riding. The job is easily done. The full equipment is shown in the picture on the right. Attach a small radio set to a board fastened to the handle bars of the bicycle. To construct the antenna supports use bus bar or heavy wire fixed to the top of the radio set. The antenna and lead-in wire are plainly visible in the photograph. The battery supply is attached to the frame of the bicycle.

The radio equipped bicycle made its appearance in Hollywood where movie stars have made a fad of bicycle riding.

Putting a radio on your bicycle can be done in the simple manner shown above. The small radio set with its tiny antenna is attached to a board fastened to the handle bars. The battery supply is bound to the frame. The photo shows Patricia Ellis, film star, with her newly equipped bike.

Automaton Foils Hat Rack Thieves

THE thief who runs off with hats and coats on hat racks must find another place for his trade than the Anhalter station in Berlin, Germany. A burglar-proof hat rack automaton, now in service in the station, makes theft of clothing impossible.

The automaton, shown in the picture below, is very much like an ordinary hat rack. The guest hangs his coat, hat or umbrella on the rack, drops a coin in the slot and his clothing is safe. He receives a key with which to unlock his clothes when he wishes to leave the station.

The burglar proof hat rack in use in Berlin, Germany, is shown above. By dropping a coin in a slot the guest automatically locks his clothing on the rack and receives a key with which to unlock it when he's ready to leave

Rays Show Invisible Bloodstains

DETECTION of murder clues by infra-red photography is being developed in England.

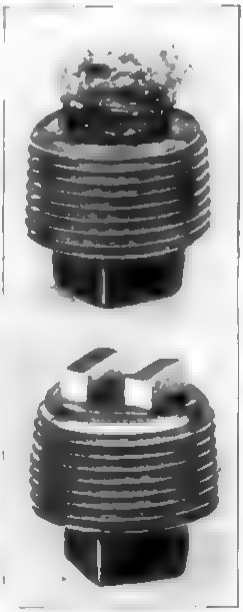
Bloodstains, entirely invisible to the eye, were revealed on dark-colored cloth in an infra-red photograph taken by F. W. Martin, of the Department of Forensic Medicine at the University of Glasgow.

Magnetized Plug Cleans Auto Oil

FINE metal particles that score automobile cylinders and wear gears can be removed by a new powerfully magnetized drain plug inserted in the crankcase, differential and transmission.

The plug gathers all bits of metal floating in the oil and prevents them from working back into the motor and other moving parts of the automobile. The plug replaces ordinary drain plugs and is designed to last the life of the automobile.

Whenever the oil is changed the plug is removed as usual and the metal particles clinging to it removed.



A highly magnetized oil drain plug to remove metal particles that cause wear in an automobile motor is shown above.

$25 CASH PRIZES *for* BEST ANSWERS to *Scientific* PARADOX *Problems*

Three problems to test your observational faculties and knowledge of scientific laws behind strange manifestations of natural phenomena are illustrated here. $25 in prizes await winners who can explain most concisely and clearly why stratosphere sky is black while earth sky is blue, why report of cannon sounds only as loud as finger snap at high altitudes, and which train is closest to Chicago in speed problem at right

DO YOU pride yourself on being a scientifically-minded person?

If you do—if your mind is really cast in the scientific mould—then you expend a large portion of your mental energy in asking yourself questions about things that other people take for granted.

For instance, where other people simply notice that ice cools an ice box, you will badger your brain in search of an explanation of the phenomenon. Other people will look at a red sun at morning and evening and a white sun at noon without wondering about the why of the color change, but you will not have a moment's peace until you have learned the reason.

Now how do you measure up?

It's to help you test your observational faculties that this contest has been devised. Answering the three puzzles presented herewith will tell you where you stand.

No intricate mathematical calculations are involved in the solution. Back of each problem stands one or more physical laws, and if you know these you have a key to the answer.

Now for the problems.

No. 1. The Stratosphere Problem

If you've read carefully any stories of Piccard's flights through the stratosphere you will remember that the scientist told how at extreme altitudes he looked out the portholes and saw a sky that was black as midnight, even though the sun shone in the sky like a huge ball of blinding white flame. Can you explain this paradoxical situation? The same sun shone on us that shone on Piccard in the stratosphere, yet where Piccard looked up and saw a black void, we saw the usual mid-day vault of brilliant azure.

Stated simply, the puzzle is: Why is our sky blue and the stratosphere sky black?

No. 2. The Sound Concussion Problem

Have you ever stood on top of a mountain and almost burst your lungs trying to make someone hear you only a short distance away? If so, the experience will give you a line on this problem.

Here it is. Assume you are standing on the top of some lofty peak, say Mount Everest. At a distance of 200 yards is a medium bore cannon, say a French 75, ready to blast away. When the gun fires, however, all you hear is the sound having about the volume of a finger snap.

Now at sea level the report of the "75" would be deafening, while on Mount Everest (altitude 29,140 ft.) it is hardly audible. What physical conditions account for this difference in audibility?

No. 3. The Train Problem

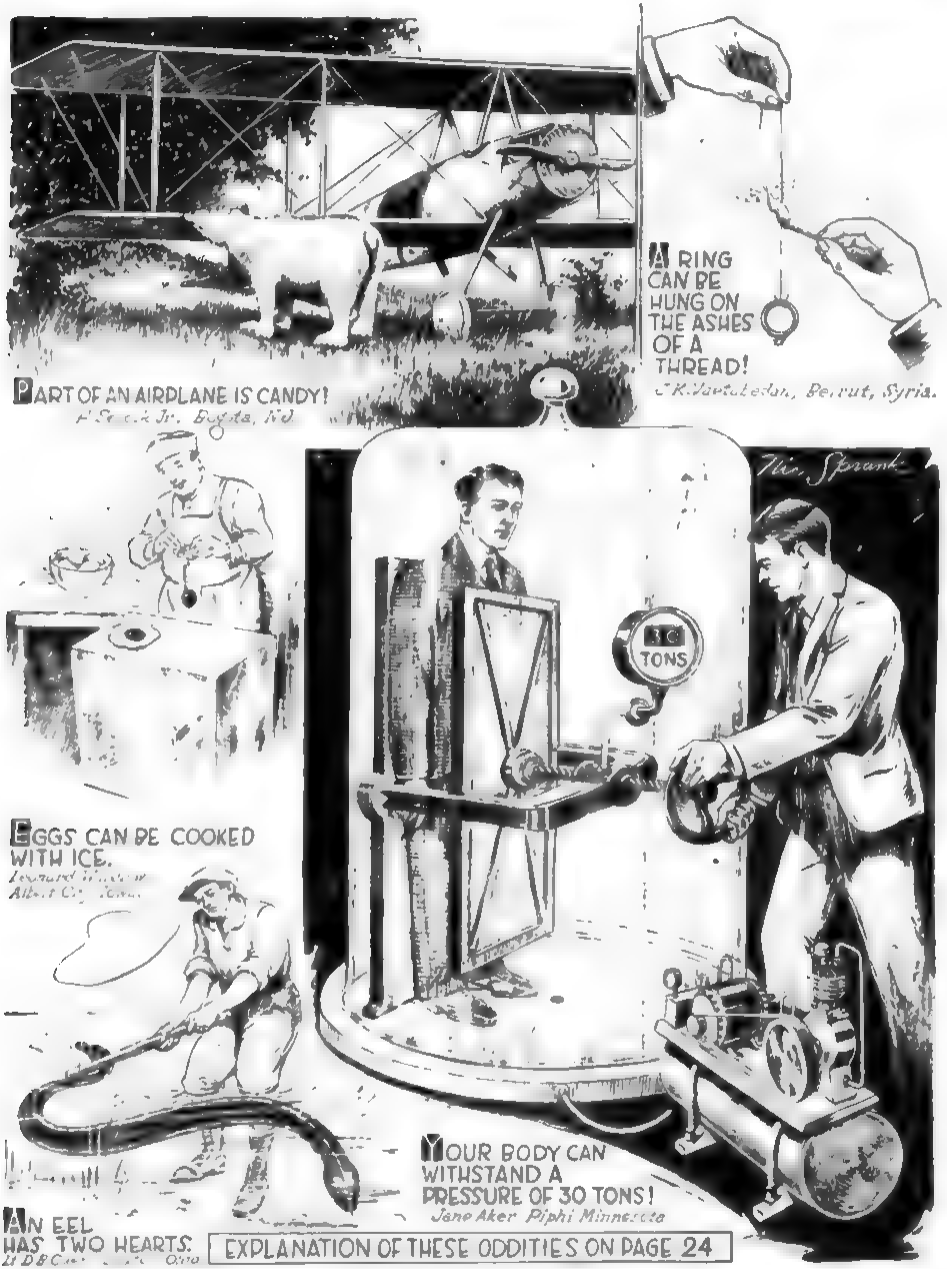
Here's a problem for mathematicians. The speed of two trains, their time of departure, and the distance between stations are chief elements of the problem, which follows:

Train "A" leaves St. Louis at 7 A. M. speeding toward Chicago at 40 m.p.h. Train

(Continued on page 26)

Oddities of SCIENCE

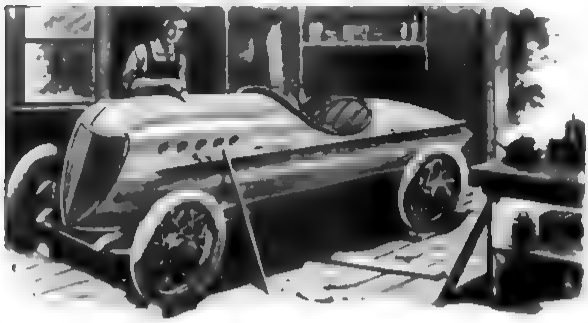
by NIC SPRANK



EXPLANATION OF THESE ODDITIES ON PAGE 24

These strange facts of science call to our attention a few of the things which on every hand refute some of our accepted notions about nature. ONE DOLLAR will be paid you by Nic Sprank for every Oddity he considers good enough to make this page. Try your luck! Send in something new—don't re-hash the obvious, and your chances of cadging a dollar bill are as good as the next man's. Address Nic Sprank, care Modern Mechanix, 529 So. 7th St., Minneapolis, Minn.

Money-Making STUNTS



The depression was awful, people are saying—but it was a boon to thousands of readers of this department. Utilizing ingenious ideas presented here these enterprising ones have built independent businesses yielding a surprisingly large income. Here are two pages more of these money-making stunts to help you.

Turn Old Cars Into Profit

OLD automobiles, rebuilt with new bodies, return a good income to an unemployed mechanic in Montana. He makes a profit of $125 to $200 on every car.

The Montanan buys old cars, of any year or make, as cheaply as possible. The motors and transmission are thoroughly overhauled and the chassis cleaned and painted. For each type of automobile he designs and builds a strong, modern, stream-lined racing body. His cost averages $25 per car. The rejuvenated automobiles sell for $150 to $300. Quite a neat profit, what!

Novelty Chairs From Auto Seats

Old auto seats can be used to build novelty chairs and settees for homes and offices.

The seat cushions can be purchased from automobile wreckers for 25 cents each. Inexpensive wood turned legs add to the attractiveness of the furniture. A little ingenuity, carpentry work, staining, varnishing and polishing is all that is needed to produce unusual chair designs at small cost. Home owners grasp at the opportunity to buy.

Earns $6 a Day in a Cemetery

Even cemeteries are a source of income! A Philadelphia man is earning six to seven dollars a day cleaning tombstones and monuments.

He solicits the work on Saturdays, Sundays and holidays while people are decorating the graves. He charges 75 cents for cleaning small stones and up to two dollars for larger ones. Hydrochloric acid and hydrofluoric acid cleans granite, and pumice stone and water is used on marble. Further directions for cleaning stone can be found in any public library.

Adjusting Gas Stoves

Housewives will willingly pay fifty cents to have their gas stoves adjusted when they learn that their gas bills will be lower.

Properly adjusted gas burners often will use as much as ten percent less gas. An ice pick, screw driver, plyers and a small oil can is all that is needed. Clean the holes with the ice pick, adjust the air mixture for a clear blue flame, and oil the knobs to make them work easily.

Good Cook Aids Husband

With the help of his wife, a salesman who lost his position has built up a good business selling pies and cakes.

The wife did the baking while the husband solicited the business and took care of the deliveries. Later satisfied customers placed so many repeat orders that soliciting was unnecessary.

Initialing Mechanics' Tools

A young man made an average of ten dollars a week initialing tools for automobile mechanics and machinists.

He charged three cents for every two letters engraved on a tool. The steel to be engraved is covered with a layer of wax and the initials cut through this layer to the steel. Nitric acid put on the stencil with a medicine dropper eats into the metal and engraves the lettering.

Trading Popular Song Music

In one hour a jobless man earned two dollars by trading old popular song music he had for other modern melodies.

Going from house to house he found many persons who wanted the songs he carried and were willing to exchange them for others they had. He charged a few cents for each sheet of music he traded.

CASH FOR MONEY-MAKING IDEAS!

Have you worked out some ingenious, practical way of making money, either as a full-time job or a spare time activity? Perhaps some friend or neighbor, thrown out of work, has used his wits to devise some money-making scheme which brings better returns than the job he lost—this very thing has happened so often recently that many men look on depression as a blessing in disguise. For all accounts used in this money-making department of the magazine, payment will be made at regular rates. Here's your chance to become an author! Keep your article brief, and address it to Modern Mechanix and Inventions, 529 South Seventh Street, Minneapolis, Minn.

Bring EXTRA INCOME

Advertising With an Automobile

By advertising with a public address system installed in his automobile a young man has established a business of his own.

He makes arrangements with business concerns to advertise for them. A small phonograph with a pickup is used to draw a crowd at a busy corner. Then the young man does his advertising, calling attention to sales or special features of stores and theatres. Painted signs attached to the car further attract prospective customers.

A Trading Bureau

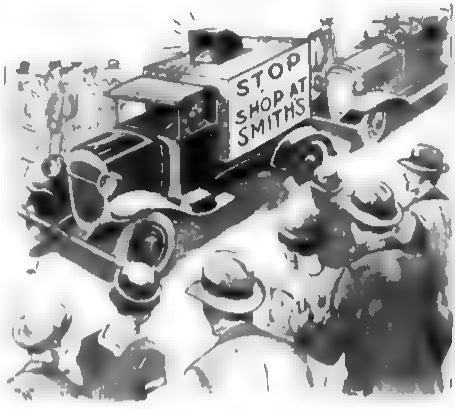
Barter and exchange led to the development of a thriving trading bureau for an energetic Vancouver man.

No capital was required. He called at homes and listed household odds and ends the housewives did not want and wished to sell. At the same time he inquired if there was anything his clients wanted. If a customer wanted a small heater for $3.00, he consulted his list and, finding one for sale, arranged with the owner to sell for $2.50. His business increased until he opened a trading bureau store where he sold the goods on a commission basis.

Organizing Auctions

Community auctions, easily organized, can be made a paying business anywhere. You get your profits by charging a commission of ten percent or more on everything sold and, if you are not a good talker, you can get someone to do the auctioning for you.

Rent a vacant lot in the business district, arrange with merchants to dispose of goods they wish to unload at a sacrifice, and advertise the auction sale. The merchants will be more willing to cooperate if they know the sale will be advertised and will bring people to town to buy not only at the sale but at their stores. Sales of farm stock and machinery and of second hand automobiles also can be arranged.



Home Cooked Potato Chips Sell

Two western youths are earning money for college by selling home cooked potato and cheese chips put up in printed cellophane bags.

Their business has grown so rapidly that they are not only supplying home town merchants, but are branching out into neighboring towns as well. The cheese and potatoes are fried at the boys' homes and put into the attractive bags bearing their names and the inscription "A Home Cooked Product." The bags sell at ten cents each retail or ninety cents a dozen wholesale.

Let Your Camera Earn Money

An ordinary camera earns a good living for a boy whose hobby is photography.

He snaps pictures of unusual scenes, birds, animals, children, accidents and other human interest features. He develops and enlarges his own pictures and sells them to trade journals, magazines, newspapers and Sunday feature sections. He also arranges to take photographs for authors to accompany their articles.

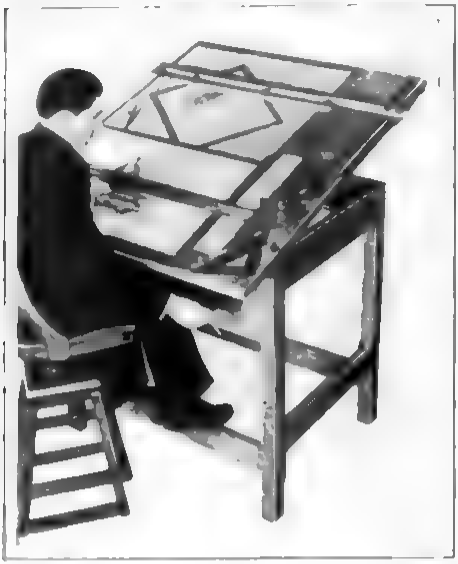
The Sportsman's Handy Man

Repairing and cleaning hunters', fishermen's, and campers' equipment can be developed into a well paying trade.

The field of work for fishermen includes refinishing fishing plugs, sharpening hooks, varnishing and rewinding bamboo poles, relacquering steel rods, and cleaning and polishing reels. Charge for the work according to the time and material required.

Tired hunters will gladly turn over the job of having their guns and equipment cleaned. Rebluing gun barrels, refinishing gun stocks, and waterproofing tents and canvas can also be done.

Machine Makes Perspective Drawings Accurately, Rapidly



Perspective drawing is made by tracing lines from top view on sheet at top of table, the while operating ruled drum at side to establish lines of perspective.

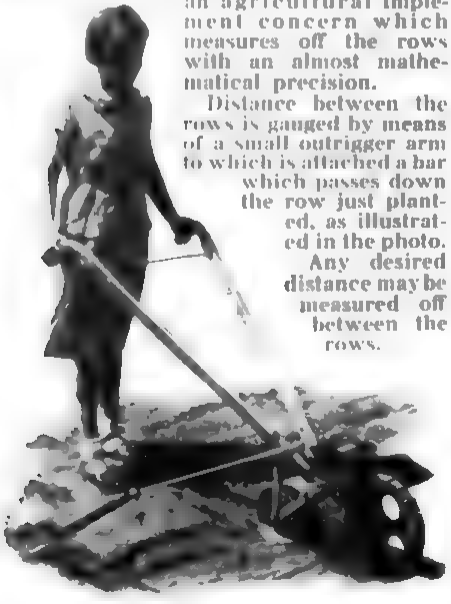
A DRAWING table recently devised reduces the making of perspective drawings to a task of the utmost simplicity. The outstanding element of the table is a cylinder and a sliding straight-edge mechanically connected together. The straight edge lies across a sheet of specially ruled pape as illustrated in the drawing, while there is attached to the cylinder a sheet of ruled paper with lines representing certain perspective measurements.

Each point in the perspective drawing is located by first, setting the straight-edge on the point, and turning the crank; second, projecting this point horizontally from the perspective measurements on the cylinder, third, following the lines on the specially ruled paper to the projection made with the T-square.

Planter Gauges Row Distance

IDEAL for truck gardeners and small farmers is a new planter being marketed by an agricultural implement concern which measures off the rows with an almost mathematical precision.

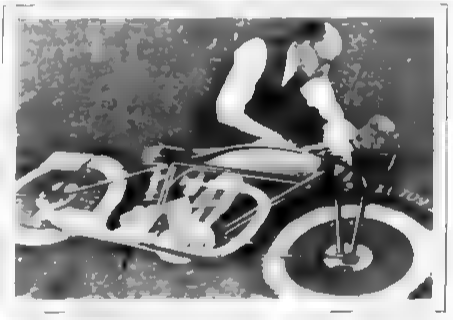
Distance between the rows is gauged by means of a small outrigger arm to which is attached a bar which passes down the row just planted, as illustrated in the photo. Any desired distance may be measured off between the rows.



Gauge bar on the outrigger arm of the planter follows down preceding row to measure proper distance for planting following row. Bar may be adjusted to any distance.

Dummy Motorbike Teaches Safety

RAILWAY workers on English roads get thorough training in First Aid. Below are seen two railroad men practicing rescue work. The "victim" is pretending he has been knocked off his motorbike, while the engineer is treating him for injuries. Feature of this episode is cardboard motorbike.



English railway workers practicing first aid. The "victim" riding a dummy motorcycle has just been struck by a speeding tram, while fellow worker is administering first aid.

U. S. Invest in Exiled Scientists?

SYSTEMATIC investment by America in European scientists of proved ability now being driven out of their own countries by racial prejudices or by other features of the vast social disturbances abroad is urged by American scientific leaders.

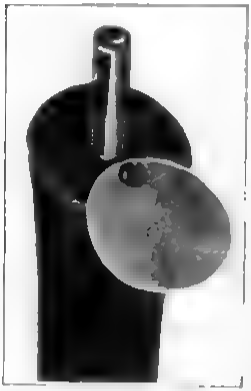
Just now a large number of highly skilled and able scientists among German Jews are losing their positions in that country and are being forced to emigrate, as happened recently to Professor Einstein. In Russia and some other European countries emigrations of scientific men are being forced by other prejudices or by poverty. Why not endow in perpetuity five thousand of the ablest scientific men of the world with $200,000 each? It would be the most profitable investment ever made, it is argued.

Pole Holder Catches Fish While the Fisherman Sleeps!

OH FOR the life of a fisherman!—with one of the gadgets illustrated at the right. No more handfuls of blisters from many weary hours of tensely holding on to your fishpole. The clamplike device with the universal adjustments visible make it possible to enjoy an uninterrupted nap out on the water while the fish rises to the bait. When he's caught he must await your pleasure! Pole yanks and holds him.

A fishing pole holder, which can be set at any angle, and fastened to boats, trees, etc., is the latest development for the sportsman. It was shown at the National Inventors' Congress at San Francisco. Two of the holders are demonstrated by Miss Barbara Pomeroy.

Nail-set Carried in Hammer Handle



Nail-set compartment provided for handiness and efficiency.

FOR the workman who is always losing or misplacing his nail-set, this little arrangement will prove very useful. A hole, just large enough to take the set, is drilled in the end of the hammer handle. Then a small brass slip cover held in place with a small wood screw is arranged so that it will keep the nail-set in place when it is not being used. Proper fit prevents rattling.

Mechanical Maid Slides to Table

A MECHANICAL maid has made its appearance in the form of an electrically heated food carrier which slides on a track from the kitchen range to the person serving at the table. Then, after the hostess has dished out the food, the portable table is pushed to one side, where it waits to be called on for second helpings.

Six compartments for as many different edibles are furnished, along with coffee pot.

"Mechanical maid," slides on track from kitchen range to hostess. Displayed at Nat'l inventors congress at San Francisco.

Plugging-up Dirty Air Currents

IN RESIDENTIAL hot-air heating systems the housewife is often greatly annoyed to find that soot marks accumulate on the wall-paper, due to the leakage of the warm air from the furnace through cracks and spaces that exist between the register fittings and the wall just where the pipe joins the register. These spots may be prevented, however, by sealing with plastic wood or with fresh putty. If it is desired to make a more permanent type of repair, the inner surface of register may be "faced" with some insulating material for sharp edges of the hot-air pipe to "butt" against when the register is replaced.

Cracks between register and wall made air-tight with plastic wood.

WHERE TELEVISION

IF YOU were one of the comparatively few men who saw the first few television demonstrations, you no doubt were one of the men who said that television would take some time to perfect.

Doubtless you therefore have an avid curiosity about the progress of television in the last twelve months.

From the first crude, flickering red images—the best that were available at this time last year—we have made the following progress:

We can now give you pictures in white light of near-cinematic quality.

The line caused by the light pencil has been nearly eliminated.

Large screen pictures have become practicable.

There are 30 television stations broadcasting nightly within easy receiving range of every state in the union. Four of these stations are of 1 kilowatt capacity. It has been my pleasure to build and operate one of these first four 1 kilowatt stations, so you see I may be said to be a pioneer in television. I know that I get a great kick out of being the only individual aside from the large corporations who has gone in for television on so ambitious a scale. I have watched eagerly the progress of the new art and science this last year, and I get a great thrill out of realizing that in the city of Chicago there are 2,000 sets in regular operation, over 100,000 receiving sets in New York City and as many more in scattered localities throughout the country.

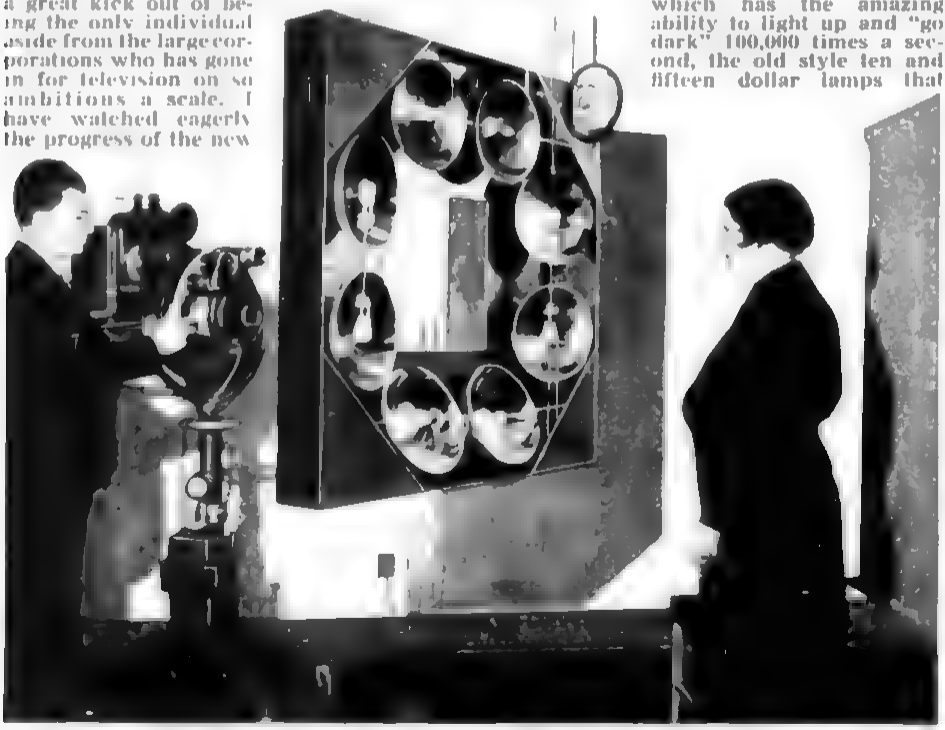
A new crater-type neon light (red) or nitrogen light (white) has been brought out by the Duo-Vac people of Brooklyn which costs but a dollar and a half and is but the size of the bulb in your car headlight. As a matter of fact, it has the same base as your car bulbs.

This new light is to television as the low-cost vacuum tube was to the old crystal radio set. It gives POWER to the weak signals.

No More Red Images

By its use we can get pictures in white light. We can do away with the bull's-eye lens that featured machines of last year, because there is enough light emitted by this phenomenal new lamp to project a picture on quite a sizeable ground glass screen.

Now, due to this new type of lamp, which has the amazing ability to light up and "go dark" 100,000 times a second, the old style ten and fifteen dollar lamps that



Dr. Young is shown at the scanner built in his own laboratory by the brilliant television expert, Meyer Eisenberg. This shows the battery of photo cells which the performer faces in the dark as the beam from the scanner pencils the singer's face. Above can be seen the ordinary microphone. This is the equipment of W9 ICI, Minneapolis.

STANDS Today

by **DR. YOUNG**
Operator, WDGY

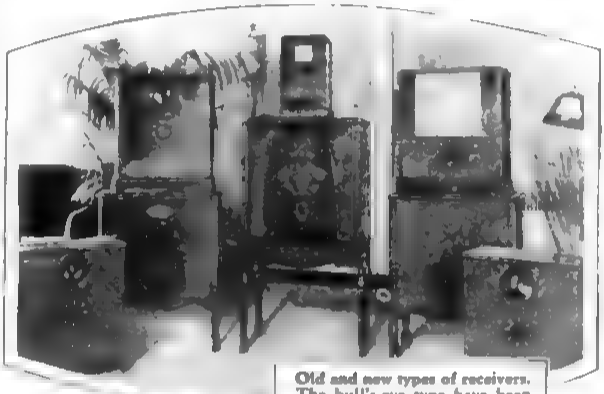
In this article the well known owner of station WDGY and the owner-operator of the largest private television station, W9 ICI, gives you a resume of the past year's progress in this fascinating new development.

were as bulky as a young watermelon can be thrown away. These new lamps are worlds more efficient, draw but 2½ volts a. c., and cost but a dollar and a half. Thus the cost of the renewable element of the television set has been reduced 1000%, and power has been stepped up nearly as much. That, I claim, is quite a step in progress for a short twelve months.

You see, just as the first radio broadcasting made no progress until low-cost vacuum tube introduction allowed manufacturers to put out a reliable set requiring no special skill in manipulating, so television could scarcely have made any progress from the greatly overfooted press blare of its baby days until we could announce milestones like those just enumerated: good pictures, white screens, cheaply renewable and efficient white lights.

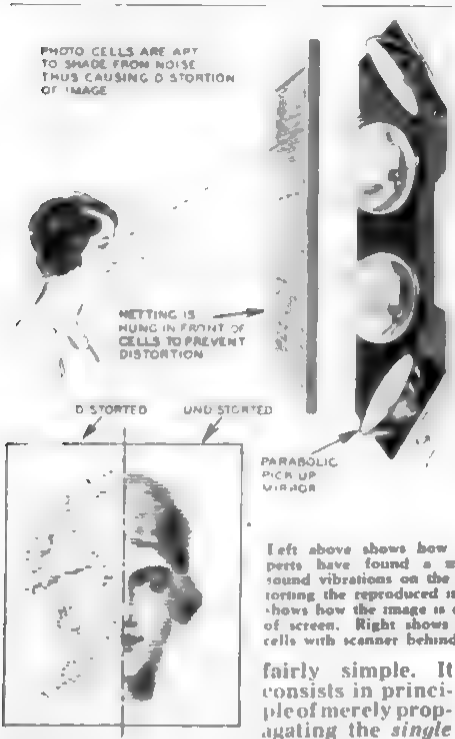
Just look back and realize that when station KDKA, run by Westinghouse, first began its programs ten years ago receivers were so far below present day standards that to listen to one of these old sets will make you laugh at yourself for ever having expressed wonder at its performance. The first sets had earphones, and you were satisfied. The first loud speaker, Magnavox, looked like a mushroomed auto horn. Yet what a wonderful thing it was in those days to be able to listen to a radio without a pair of earphones! Marvelous? Yes, and that was only ten years ago.

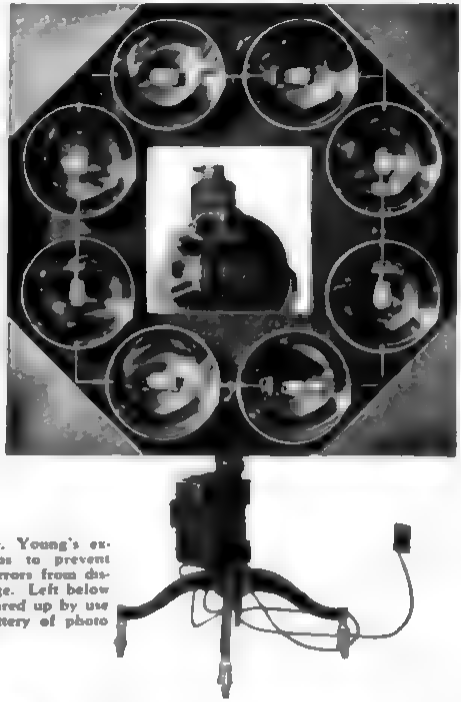
In its essence, the problem of radio is



Old and new types of receivers. The bull's-eye type have been made obsolete by the types with the large opaque screen

Here is Dr. Young's "ham Heaven" where the equipment for his 1 KW television broadcast station was built. Right, new receiving bulb in section





Left above shows how Dr. Young's experts have found a means to prevent sound vibrations on the mirrors from distorting the reproduced image. Left below shows how the image is cleared up by use of screen. Right shows battery of photo cells with scanner behind.

fairly simple. It consists in principle of merely propagating the *single modulated current* produced by the voice, broadcasting it over great distances, and picking it up on an aerial somewhere, and then strengthening this signal through amplifying valves to the point where it can be used to actuate a glorified telephone receiver called a loudspeaker.

Television Principle Is Complex

Television as a problem is infinitely more complex. First the transmitting machine breaks down the picture into an electrical impulse, or set of impulses. These sets of impulses are then broadcast just as sound is broadcast. If there is any sound to accompany the picture it must be broadcast with the picture in the ordinary manner, and synchronized to boot.

This complex signal is sent out and picked up by an aerial at a distant point. Here it is split up again into its component parts, sound and light, to form the talking television image.

The sound problem has never troubled television, for it is a fairly simple single modulated wave. But in order to break down a televised subject into an electrical signal and do it rapidly enough to catch lip movement and eyelash flickers it is necessary to shut the current on and off upwards of 30,000 times a second. This is easily done at the transmitting or pickup end, but the problem has been to catch this signal in the light-emitting half of the television receiver (the part that builds the picture) and at the same time obtain (1) synchronization of image (2) brilliancy (3) absence of pencilling effects and (4) white instead of red images.

With the advent of the crater lamp we can today secure white images of brilliance sufficient to dispense with the bull's-eye lenses that were on last year's sets. (They were used to magnify the weak light concentrations of the former small pictures.)

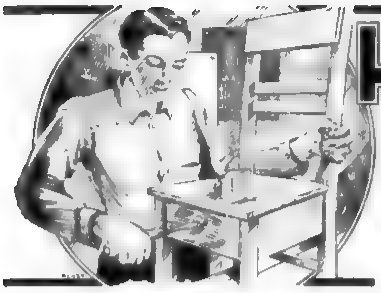
Synchronization is cleared up by the use of the Senabria system of scanning lenses which uses three spirals instead of the old fashioned single helix. See sketch. This new disc "averages" out any aberrations that might be caused by a slight imperfection in one of the old spirals, which because it was the only channel through which the light could pass, would repeat its mistakes with every revolution.

No More "Pencilling"

Thus defects in pencilling, or painting of the image have been done away with, or at least put "under control."

We have found that a mesh screen placed in front of the photoelectric cells will not affect the light received by them, and will eliminate the mixing of noise with the picture (one of the causes of floating images of last year). The screen softens the music

(Continued on page 134)

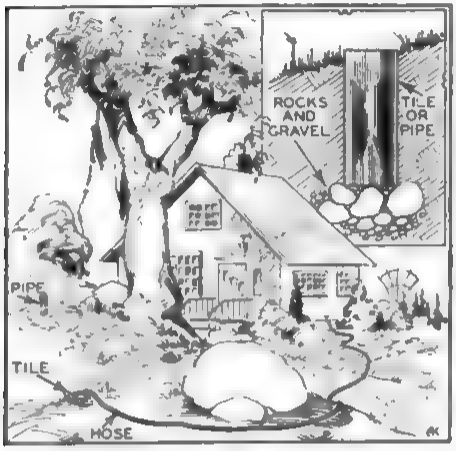


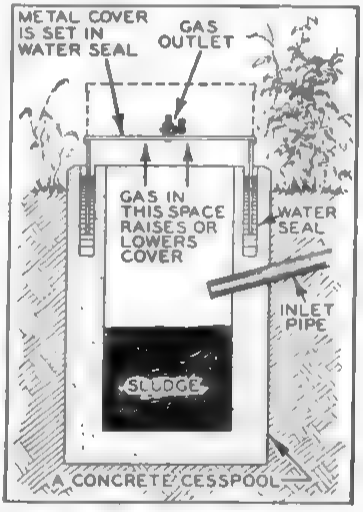
HANDIKINKS for Everybody!

Save time and labor by consulting these pages when you have a difficult job on your hands.

Watering Hillside Trees

TREES living on hillsides and terraces often have a tough battle for existence, due to the fact that the water drains off too fast to penetrate to the roots. To overcome this difficulty, set a number of pipes or tile in the ground around the tree, placing a few large stones around the bottom to allow the water to seep away more readily. Insert your garden hose in the pipe periodically and give the roots a thorough watering. Pipes should not to be too close to the tree trunk. The diagram shows three pipes in place around a tree. Method of setting the pipe is further illustrated. - Wilbur J. Brown.





Scientifically Built Cesspool Is Odorless

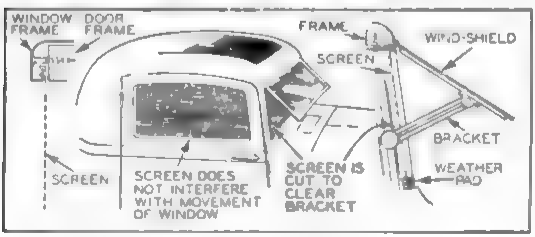
THE man who wants to sink a cesspool, but whose soil is too shallow to take a very deep one, will find this ingenious stunt a solution to the problem. First, a concrete pool for the sludge is built in the usual way, except that in the concrete wall a water trap is moulded during the pouring process. Next a wooden cover is shaped so that, when inverted, it fits neatly down in the trap, which is filled with water. With this arrangement, the gases and foul odors are confined within the interior. You'll find it advisable, ever so often, to open gas outlet valve and free the cesspool of its gases. Do this during a high wind, or on a hot day, when the odor will pass off quickly.—Homer Z. Keener.

Screen Car Doors and Windshield to Keep Out Bugs While Motoring

THE motorist who drives a lot at night, or who sleeps in his car, often feels the need of window screens. Here's the answer to the need. Doors of modern cars have stamped frames which are easily removed by taking out half a dozen screws. Ordinary window screening is stiff enough so if it is tucked around the flange on the frame, no other fastening is necessary. Merely replace the frame in the door.

When you come to the windshield, bend the edge of the screen at an angle and slip it above the cap strip at the top. The screen should next be carefully cut to fit the frame of the opening and then slid behind the soft rubber cushion against which the windshield closes.

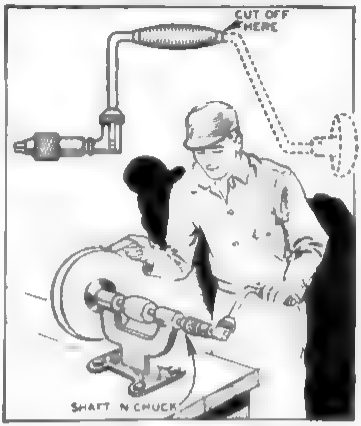
Emil Kraft.

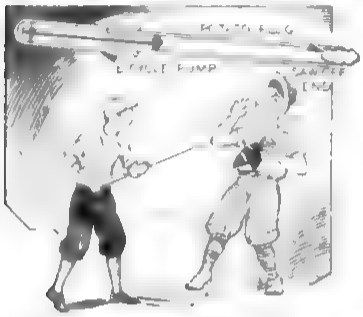


A Page of Interest to Everyone

Drill Brace Makes Bench Grindstone Crank

A GRINDER that will do a surprisingly good job of sharpening your workshop tools can be easily and quickly improvised from a bearing, a stone, a shaft, and an old brace. The layout is seen in the drawing at the right. To make the handle, lay violent hands on a hacksaw and cut off the top portion of an old brace. The chuck of the brace grips the shaft passing through the bearings and provides excellent turning facilities. Rotary speed of the stone will not be very great, but great enough to do the job satisfactorily. Mount the grinder on the bench at any convenient point.—Fred W. Schneider.



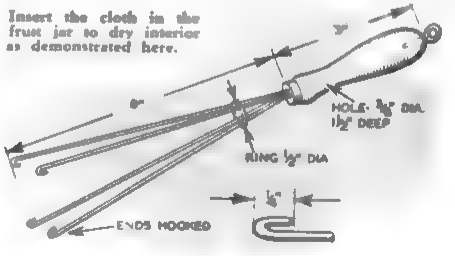


Novel Spud Gun Fights Sham Battles

YOU'LL get a big bang out of engaging in sham battles with friends, using this little potato gun as your weapon. The firearm is constructed from an old bike tire pump whose end is sawed off to take the potato plug. The gun is loaded by thrusting the sawed-off end down in a potato. This loads the end of the barrel with a plug, which is ejected with amazing force when you plunge in handle of pump.—A. Cole.

Handy Holder for Cloth Makes Quick, Easy Job of Drying Fruit Jars

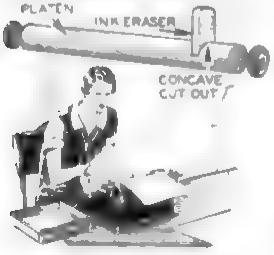
CLEANING out fruit jars becomes an easy task with this little gadget in your hands. The device is nothing more than a wooden handle with four wires of equal length stuck in the end, as illustrated in accompanying photo and drawing. The cleaning cloth is gripped by the wires when the ring is slid toward the end. This arrangement is then thrust down into the jar and worked around to dry out the glass.—Douglas Wanner.



Wires, with hooks on end, are inserted in the hole in end of the wood handle. Slipping down ring grips cloth.

For Slipping Typewriter Platens

PLATENS of adding machines and typewriters under constant use become glazed, causing work to slip in the machine. Cleaning is often done by washing off platens with alcohol or benzine and then roughening them by sanding lightly. A better plan is to cut out a common ink eraser to a concave edge as shown and use it for cleaning the surface. There is just enough grit in the eraser to remove the glaze and not make any deep objectionable scratches.



The stunt is to turn the platen around and around until it shows signs of smoothing down. About five minutes labor should convert your old platen into a job almost as good as new. - Lester P. Young.

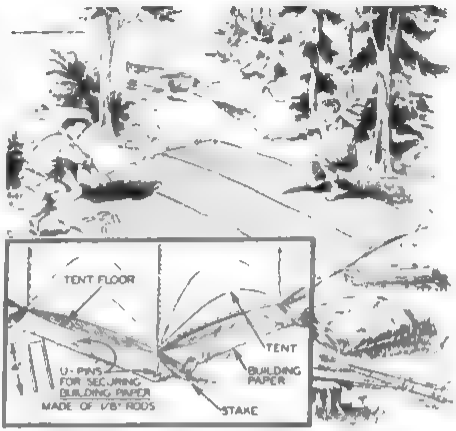
Make Camping a Real Pleasure

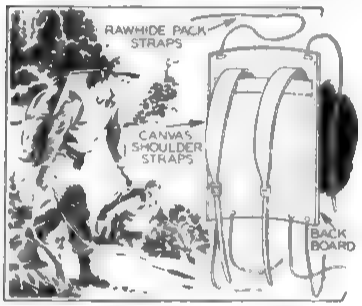
Building Paper Saves Tent Floor

BUILDING paper under a tent floor will greatly increase the life of the canvas floor covering. The building paper prevents dampness from seeping from the ground through the floor. This in turn saves the canvas flooring from rotting.

Strips of the building paper are cut to the length of the tent floor. These strips can be fastened together lengthwise to make one long roll or they may be taken separately and rolled into a shorter bundle.

The building paper is laid down on the ground first and fastened with U pins. The pins can be made of ⅛-inch rods bent to form a staple four inches long. The regular flooring material is placed over the paper and the tent set up in the usual way.—John H. Kay.



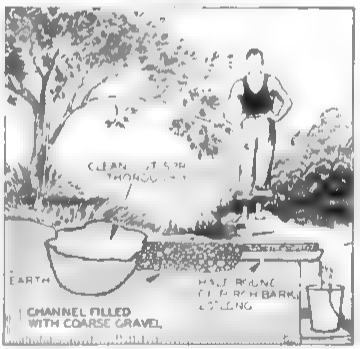


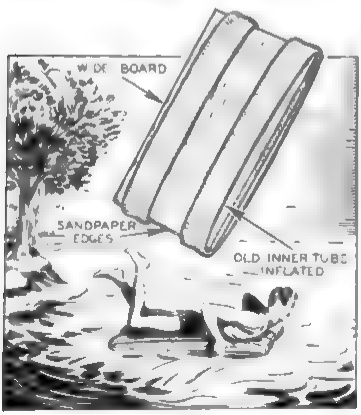
Carry 200-lb. Load With This Pack Board

OUTDOOR hikers can carry loads as heavy as 200 pounds with the pack board illustrated here. The board permits freedom of movement, yet can carry more supplies and equipment for the long distance hiker than the ordinary shoulder pack. The board itself is made of wood to which canvas shoulder straps are attached. These straps are adjusted through buckles fastened to the lower part of the board. Rawhide thongs slipped through holes in the board hold the pack in place. The board may be slightly curved to allow air circulation. C. E. Renell.

Simple Filter Clears Tainted Camp Water

INFECTION from water at camping sites can be prevented by building a simple filter through which the water is cleared of all impurities. Leaf deposits, moss and twigs should be removed from the pool. Dig a channel from the spring deep enough to drain the overflow and keep the water running, fresh, and cool. Cut away a half round of bark about 20 inches long from a six-inch birch sapling. Place this at the end of the channel. Fill the channel nearest the pool with coarse gravel and the birch bark with finer gravel. — I. H. Motes.





Bob Over the Waves With This Water Sled

COASTING over waves or the surface of the "ole swimming hole" is great fun with the easily-built water sled shown on the left. The sled is a simple affair made of inner tubes and a board. The board should be wide enough and long enough to support the greater portion of the body. The edges of the board are sandpapered to prevent cutting of the inner tubes. Stretch the tubes lengthwise over the board and fill them with air. It is then ready for the thrills of surf riding or coasting. If the tubes are blown up sufficiently the sled can be used for a raft. Also it forms an excellent water-wings arrangement for novice swimmers.—A. Cole.

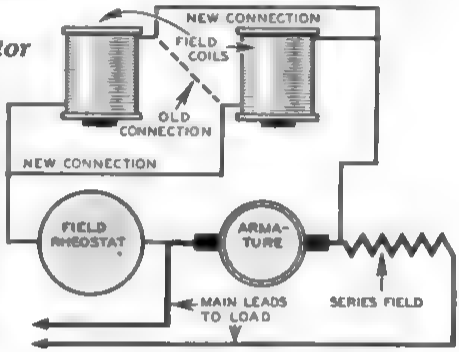
Ideas for Amateur Electricians

Improvised Outlet for Emergency Wiring

FAILURE of electricians to install outlets at some point where you have pressing need for one can be remedied by rigging up an external outlet seen in the drawing at the left. On the base of a female plug solder the 110 volt leads, along with a ¾-inch wood screw on the bottom terminal. To install the outlet, simply twist the screw into the wood, and you have an ideal connection for home or shop. The trick also makes a highly convenient radio battery outlet.—John Debecv.

Making Motor Into 32-volt Generator

CONVERTING a 125 volt 600 r.p.m. D.C. compound wound motor into a 32-volt farm generator is simply a matter of rewiring the instrument and turning it over at a speed of approximately 256 r.p.m. Ordinarily the field coils are connected in series in the original machine, so your job will be to connect them in parallel, as directed in the drawing at the right. Other connections remain the same. Output voltage should be around 40 volts, the 8-volt differential going into line loss. Rheostat and speed govern the delivery of the juice, so adjust these elements to regulate the speed. J. S. Carpenter.



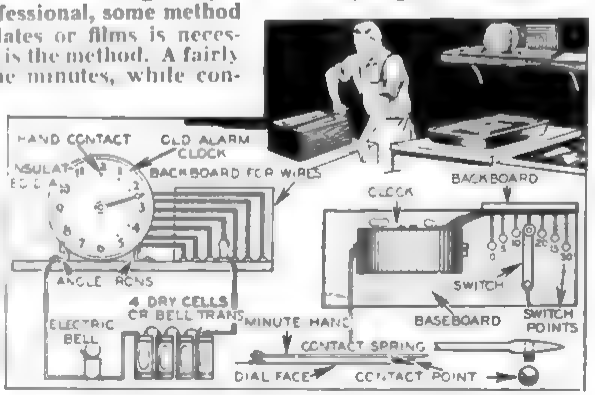
Sweeper Takes Tears From Onion Peeling

ONION peeling, even when performed by expert peelers under the most technically satisfying conditions, is a lacrimose business. Not so, however, when you bring this ingenious little stunt to your rescue. How it works is seen in the accompanying drawing. To your favorite vacuum cleaner attach a hose about 6 feet long, allowing it to terminate in the immediate vicinity of the peeling procedure. With the sweeper running full blast, the tear-producing fumes of the onion are sucked up, so they get no chance to work havoc on your eyes. The closer to the business end of the tube you peel onions, the less sadness you will display.—James Davies.

Time Signal for Developing Plates, Films

WHETHER for amateur or professional, some method of timing development of plates or films is necessary to get best results—and here is the method. A fairly reliable alarm clock ticks off the minutes, while contacts are made to ring a bell with the mechanism illustrated at the right. Remove the hour hand, and substitute for the face an insulated dial. Just below the numerals 1 to 6 insert small brass rivets, connecting them up as in the circuit.

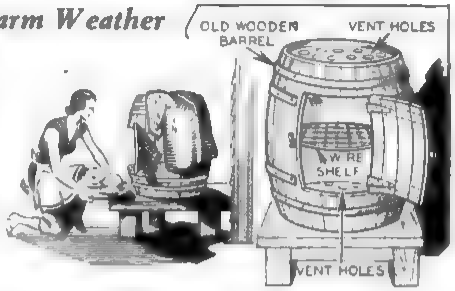
Then on the under side of the minute hand solder a contact to pass over and touch the rivets. Set hands at 12 and throw switch arm to desired minute. Bell buzz will tell you when to stop.—Walter Brixius.

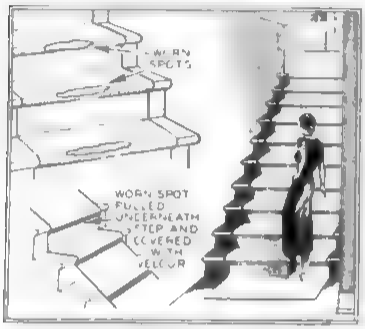


Take Drudgery from Home Tasks

Wooden Keg Keeps Food Cool in Warm Weather

AN OLD wooden barrel may not make the best of ice boxes, but it will keep food surprisingly cool, even on a hot day. Layout of the stunt is seen at the right. An old beer keg makes the best cabinet, particularly when stationed in some cool spot in the basement. Vent holes should be bored in the top and bottom to permit adequate circulation of cooling air. Install a couple of wire shelves to hold the food, close the door, and you've got a good summer or winter refrigerator.—John Edwin Hogg.





Making Worn Stair Runners Look Like New

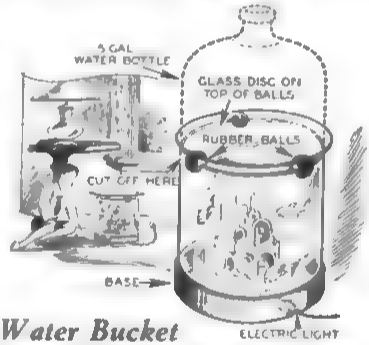
WHEN runners on your stairs grow thin at the edges of the steps it isn't at all necessary to go out and buy a new runner—all you have to do is remove the tacks and pull the entire carpet down a couple,of inches. This brings the worn spots under the projecting shelf where they will be unnoticeable.

Tack the runner down and, finally, sew a strip of velour over the worn areas to make a neat job, as illustrated in the accompanying drawing. The carpet will look surprisingly new, and serve satisfactorily for another few years. Guests will never notice the difference, thinking the velour strips merely for decorative effect.—Chester Sullivan.

5-gallon Jar Makes a Modernistic Aquarium

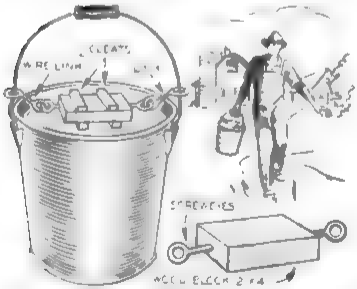
SOMETHING distinctly new in household decorations is represented in this little modernistic aquarium. A 5-gallon bottle, with top cut off, forms the container. Novelty of the ornament is in the top -a glass disc resting on three rubber balls. These balls are slit down the middle about half way and placed, equidistantly apart, on the edges of the glass.

An attractive addition is a circular metal base under which is slipped a small low-wattage globe to bring out the colors in the fish and aquarium ornaments. The aquarium serves best as a floor piece, with flower pot resting on glass disc.—Bob Isaacs.



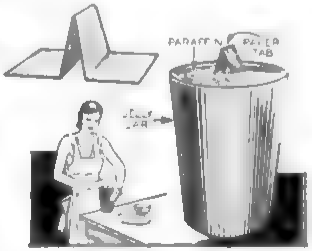
Non-slopping Water Bucket

WHEN carrying one or two buckets of liquid any distance, much trouble is experienced with "slopping." The wave silencer shown in the drawing at the left, however, does away with all spillage. When attached to the bail of the bucket it prevents high waves from making up. Altering the size of the wire link will accommodate the silencer to any size bucket.—A. H. Waychoff.

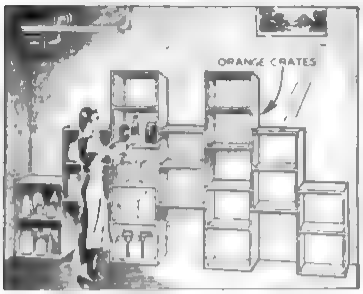


Paper Tab Opens Jam Jar Easily

HOUSEWIVES will find they'll have far less difficulty opening cans of jelly, jam, etc., if they imbed little paper tabs in the paraffin when pouring it on the top at canning time. A four-inch strip of tough paper, bent as shown in the drawing, will do the job nicely. To open the jar for the table, you simply yank on the tab and the delicacy stands open before you. No prying, shoving or punching is necessary.—Don Clammer.



Miscellaneous Handyman Items



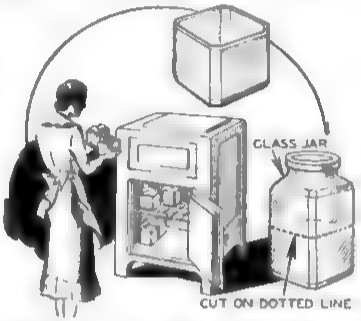
Storage Place Quickly Built With Crates

ORANGE crates, obtained at little or no cost from fruit stores, can be quickly converted into an attractive arrangement of storage compartments or shelves for the attic, basement, garage or workshop.

The shelf surfaces are smooth and strong. The crates are placed on end to make use of the strong center and end boards. The boxes can be arranged in any manner desired, including the modernistic design shown in the drawing. When assembling, the crates should be laid out in position on a floor with the backs down. Six penny nails can be used to hold the crates together. The assembly may be extended in length or height at any time.—L. F. Leuck.

Old Jars Make Handy Food Containers

NEAT, convenient food containers are easily made from old mustard, fruit and jam jars. The upper half of the jar is cut away by a simple process to provide for a wide opening in which to store various foods in the ice box or pantry. Different colored jars make attractive dishes that can be used for serving purposes. A string soaked in gasoline is wound about the jar evenly at the desired height of the container. The string is ignited and, as quickly as possible after it has burned, the jar is plunged into cold water. The jar may crack immediately along the line of the string, but it should be tapped lightly to assure an even break around the entire container.—J. L. Caton.

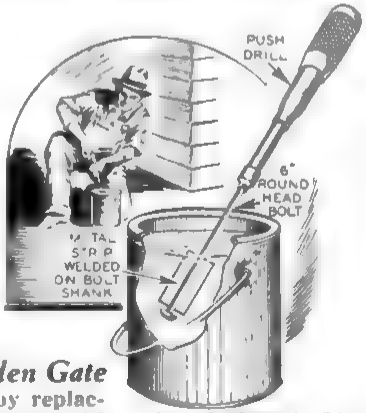


Ferns Grow Rapidly in Decayed Redwood

LUXURIANT ferns can be grown by putting pieces of redwood in the soil. A redwood plank, cut to a size a good deal smaller than the pot or box holding the fern, should be buried about two inches below the surface of the soil. By the time the fern roots become well established, the wood will have begun to decay, supplying the plant with the required nourishment for rapid growth. Soil for ferns should be rich in leaf mold to further stimulate the plant.—H. Sibley.

Mix Paint With Drill

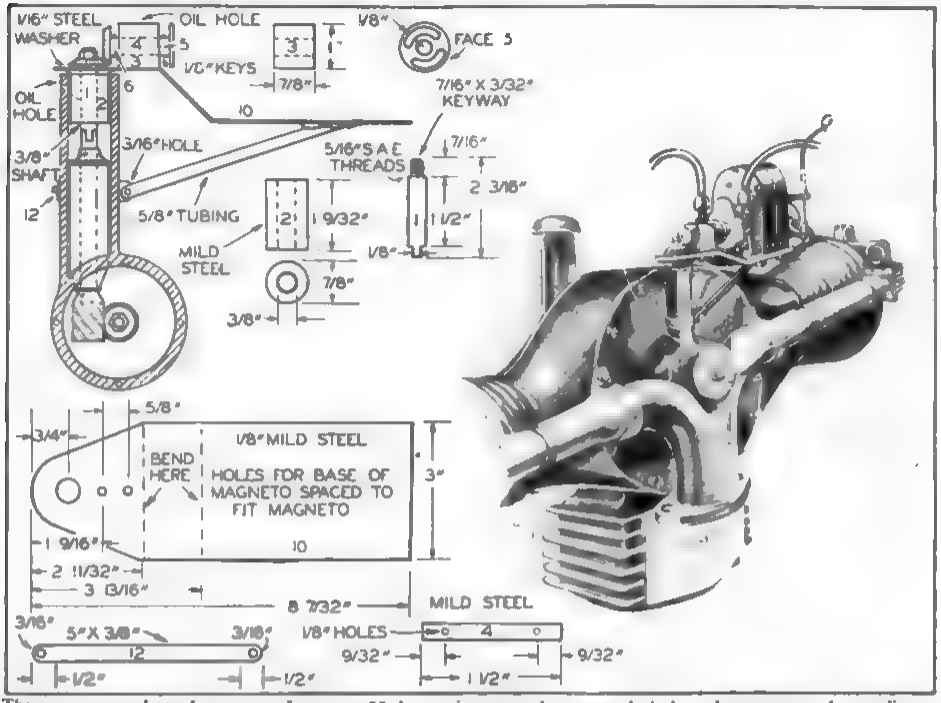
PAINT mixing is a simple task when done with the the push drill arrangement shown in the accompanying drawing. The mixer does a thorough job more quickly than the ordinary method of stirring by hand with a piece of wood. Take a six-inch round headed bolt and solder or weld near the end of its head a small, firm strip of metal. Insert the bolt in the drill and push drill mixer is ready. To stop paint from splashing out of the can, cut a hole in the cover large enough for mixer. — Altamont Cole.



Here's Bedstead Garden Gate

BEAUTIFY your home by replacing that wobbly garden gate with an iron bedstead. The end framework of an iron, brass or hollow steel single bed is about the correct width for a gate. Cut the legs off with a hacksaw to get a gate of the proper height. Fasten hinges and paint bedstead whatever color desired.—Mrs. G. W. Bain.

Magneto for Lawrence 28 h. p.



There are a number of war time Lawrence 28 h.p. twin opposed motors which have been converted according to Hickman's article obtainable in the 1931 edition of the Flying Manual. These engines are made thoroughly reliable by addition of magneto ignition which is installed according to these designs by Hickman.

by ORVILLE HICKMAN

DURING the war there were a great number of small 28 h. p. twin opposed motors built up by the manufacturers of the Excelsior motorcycles. These motors were designed by Chas. Lawrence, who later became famous as the designer of the Wright Whirlwind. They were used in non flying planes called Penguins, which were for orienting new pilots to the feel of ground flying and use of controls.

Between 1925 and 1930 the war surplus of these engines was disposed of. There is now no central source of supply, so don't write me and ask where you can get one. I showed in the 1931 Flying Manual how to convert these motors to a two throw crankshaft job which smoothed up their running qualities a lot.

Most of the boys used these engines with the original Philbrin ignition. The weight of the battery was an extreme disadvantage. To further lighten the motor and enhance its reliability I have doped out a most satisfactory magneto mounting.

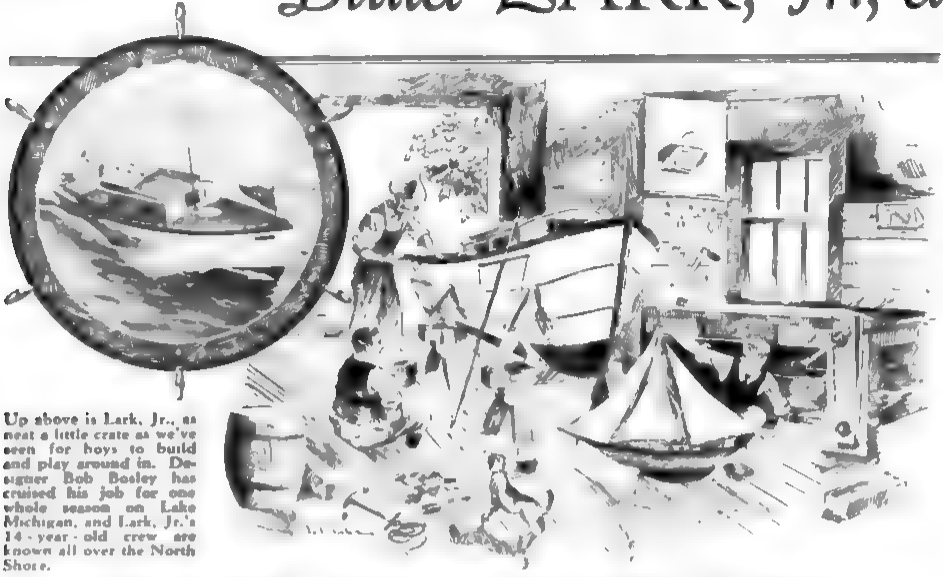
The vertical shaft in which the old distributor head sat is left alone, the distributor head taken out, and on the end of the jointed stub shaft a bevel gear is installed. A plate of ¼" mild steel is bent to allow the magneto base to drop so that the shafts are centered, and the companion 1 to 1 bevel gear is installed on the magneto jackshaft. This jackshaft is of ⅝" mild steel keyed and shouldered according to the drawing. A double coupling with slots for the adjustment of the impulse starter is put on the end of this jackshaft, and the magneto timed. It must be of the two-spark variety, or twin opposed, furnishing two sparks at the same instant in different circuits, one h.p. lead going to the right spark plug and another going to the left plug. A brace is put under the platform to keep the mounting from vibrating.

Bowden cable is led from the distributor of the mag to the dash to afford advance and retardation of spark.

Graphite in vaseline or Albany grease will be adequate lubrication for the gears for the average hour-per-day flying which is usually done at home airports.

This installation will allow double mags. For those who have these motors and who are flying them with the old or modified type of ignition and who want these parts made, I suggest that a letter might be dropped me care of MODERN MECHANIX AND INVENTIONS and your problems can be discussed.

HOW to Build LARK, Jr., a



Up above is Lark, Jr., as neat a little crate as we've seen for boys to build and play around in. Designer Bob Bosley has cruised his job for one whole season on Lake Michigan, and Lark, Jr.'s 14-year-old crew are known all over the North Shore.

Heigh ho, Sailor! Climb aboard with Bob Bosley, the designer, and Andy, the Greasemonk, and see what a sweet little ship we've got for those who yearn to build but are slim of purse.

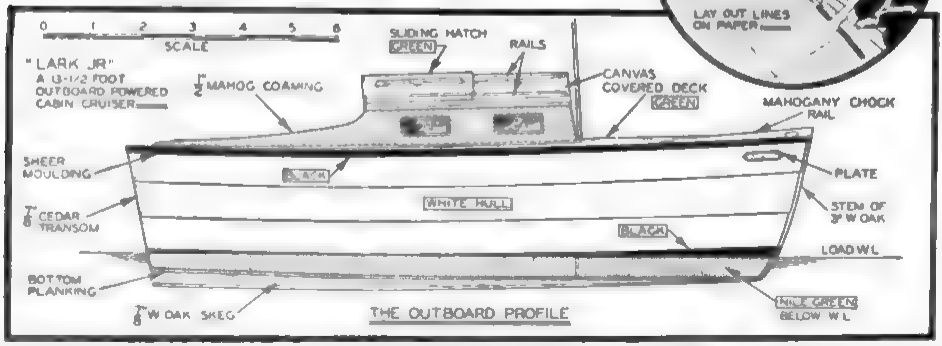
ANDY the Greasemonk rolled out of bed in the cold dawn, drew on his boots, kicked his pig Parachute from underfoot, and skipped (as is his wont) to the red-flagged mail box at the Robbinsdale airfield adjoining the lake.

In the box he found a letter from young Bob Bosley, who lays claim to being a boat designer and boat builder because he has actually designed and built himself a 13½-foot cruiser. And what's more, he has used her for the purpose she was designed to fill. Here's Bob's letter to Andy:

"Dear Andy:

"It has been a long time since I last wrote you. You will remember the photos of my little 13½-foot cruiser *Lark, Jr.*, that you liked so well you told me to draw up some plans with an action snap? Well, at last I have them completed and you will find them herein.

"About that swell writeup you gave the little ship in the most excellent March number of MODERN MECHANIX AND INVENTIONS, well, I sure did appreciate it and I re-



Outboard profile of Lark, Jr., showing the way this little hooker bulks up. Note the designer has specified even the color scheme. The black boot-top around water line helps keep surface scum invisible. A stubby military mast can be fitted.

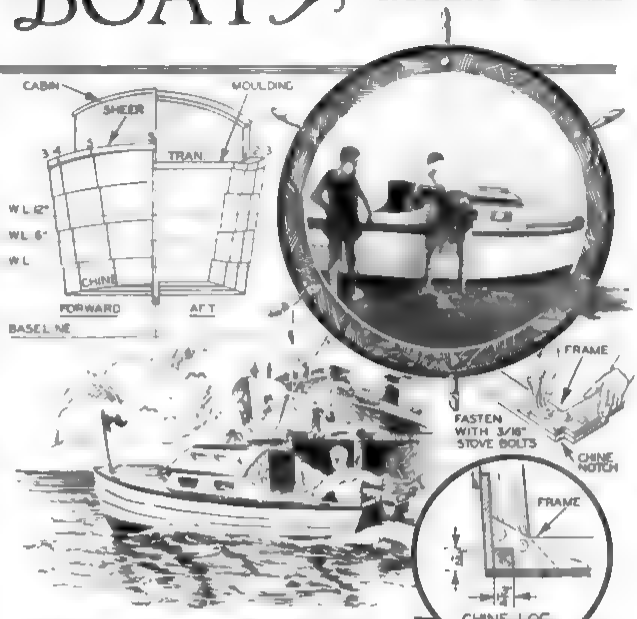
BOY'S BOAT

Designed by
ROBERT BOSLEY

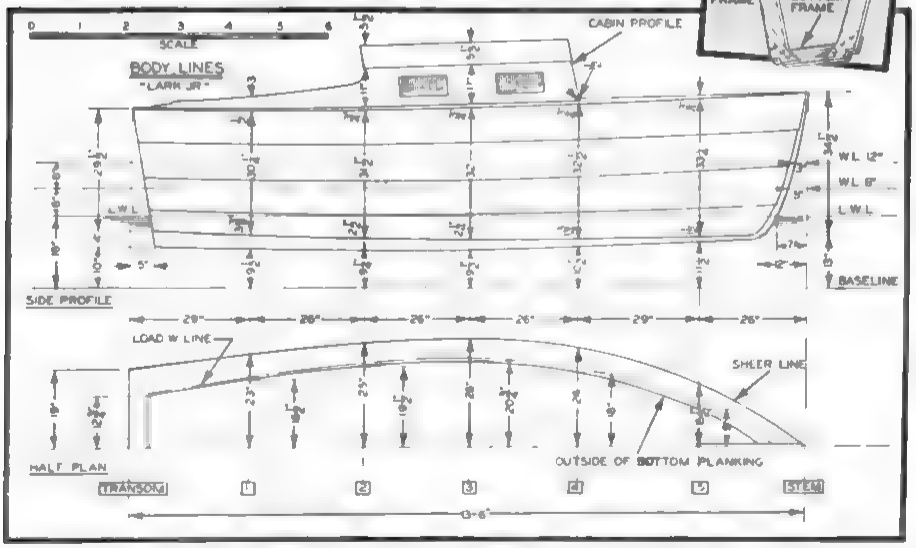
ceived ONE HUNDRED AND THIRTY-EIGHT requests for the plans of the little crate in which I writes back and tells them to watch future numbers of MODERN MECHANIX AND INVENTIONS and its sister mag for the complete set of plans. Letters from all the entire country, Canada, British Columbia, Mexico, Porto Rico, Cuba, New Zealand, came in, as well as plenty of other places.

"The blueprint herein contains sufficient information for the building of *Lark, Jr.* Any changes you see fit is O. K. You will also find an extra swell action picture as well as numerous more pertaining to the crate.

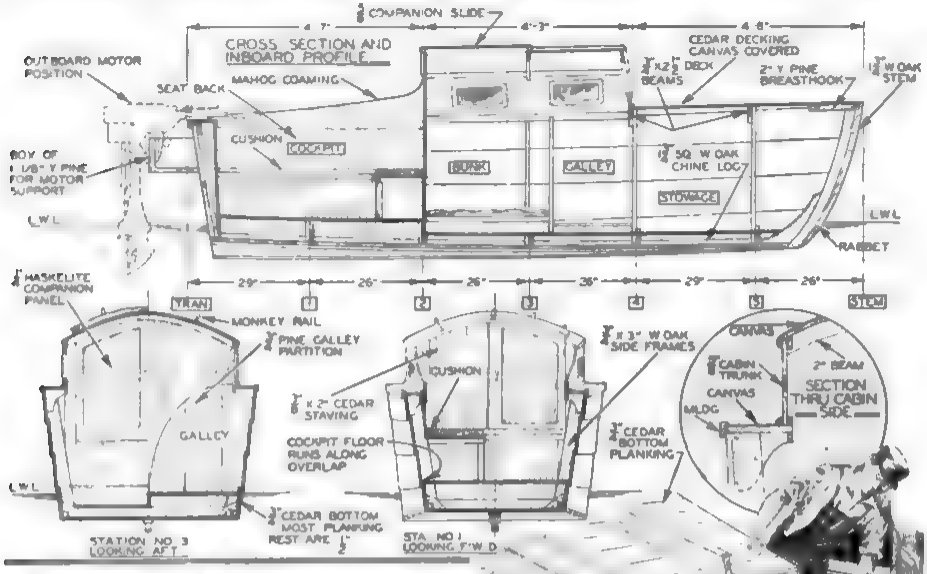
"This boat was built for the small sum of thirty-eight dollars approximately without the motor and that fact should induce MODERN MECHANIX AND INVENTIONS readers who never thought of building



Right inset shows Bosley launching Lark, Jr., in Lake Michigan. Above is the body plan for the hull which is made from the two drawings below after they are faired in with a white pine batten on a glued-up piece of drawing paper, of a size sufficient to take the whole boat at actual size. Details at right show how frame heels are notched and bolted. Chine log is 1¾ in. by 1¾ in. spruce or yellow pine.



Here are the lines drawings for Lark, Jr., with the offsets lettered right on the drawings so you can understand what they mean. These two drawings must be laid out full size on glued-up wrapping paper on a smooth floor before you commence building. This catches any mistakes in dimensions, making easier building. Remember that the body frames must have the thickness of the side and bottom plank subtracted from them, as these lines are drawn to the outside of the planking. This operation can be done after the full sized body plan has been laid out.



The specifications for Lark, Jr., are lettered right on the plans. Here is the inboard profile, together with constructional sections showing how she is put together. Her arrangement is a delight to any boy.

a boat to do so now. This crate is the last word in simplicity. My partner and myself have had no previous experience in work of this sort and let me assure you that it was not really hard to construct *Lark, Jr.*

"You promised me upon the receiving of the enclosed data to forward me $ *(deleted)* and hope you do the same as that money is all I'll have to fit out *Lark, Jr.*, with this season.

"This proposition will prove financially helpful as well as profitable to the dear publishers of MODERN MECHANIX AND INVENTIONS.

"Hoping to receive those bucks in the very near future, and will be more than glad to answer any questions, I am,

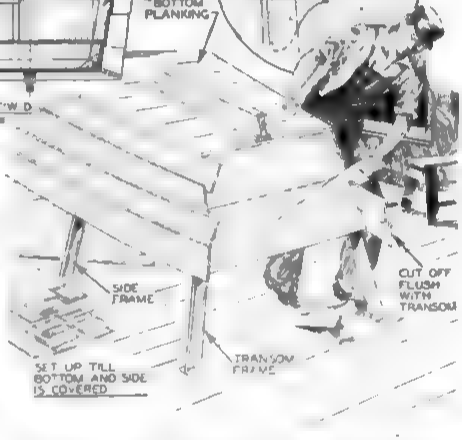
Very, very, very, very truly yours,
Robert Bosley (himself)."

* * *

Wal, boys, you've guessed it. We sent the bucks off to Bob, and it is me, little Andy hisself, who was delegated to bring the printed page to life with a petite description of the workin's. Let me tell you.

Bobbo designed and built and cruised her. Of that more later. I planned the art from Bob's very good blueprints and pics, and none other than your young pal Johnny Polivka did the drawings which you see here. So they's three of us involved in sponsoring of this little croosin' wagon. And a honey she is!

Bob and his pal cruised her up the shore of Lake Michigan all last summer,



When you have planked the sides, fastened on the bottom, put on the keel you can trim off the plank ends and caulk the seams and paint the interior in a suitable color scheme.

and a crowd was sure to gather whenever they'd make a harbor.

She is able enough to weather anything a boat of her inches has any business being out in, and she'll make a fine project for any youth. She is more a boat for the small fellow than for the grown up six-footer.

Building Steps

Take a look at the pics accompanying this article. (That's what they are for: to look at.)

Upper left shows Bob and *Lark, Jr.*, kicking it off at about 6 miles per with a 4 horsepower Johnson clamped to the back porch.

There on the first page Johnny has imagined a scene (off to the right) such as might occur in the shop where you build your *Lark, Jr.* Below is an outboard profile which gives a lot of information including the color scheme to use.

Next page shows the body plan, from

Inboard Perspective Makes Clear Accommodation Plan and Arrangment

which the frames are made. This body plan drawing really goes with the lines drawing at the foot of the page, but Johnny Polivka is an original lad and likes to move his layouts around to catch your eye. He does it too, doesn't he?

The scene in the photo adjacent shows a launching.

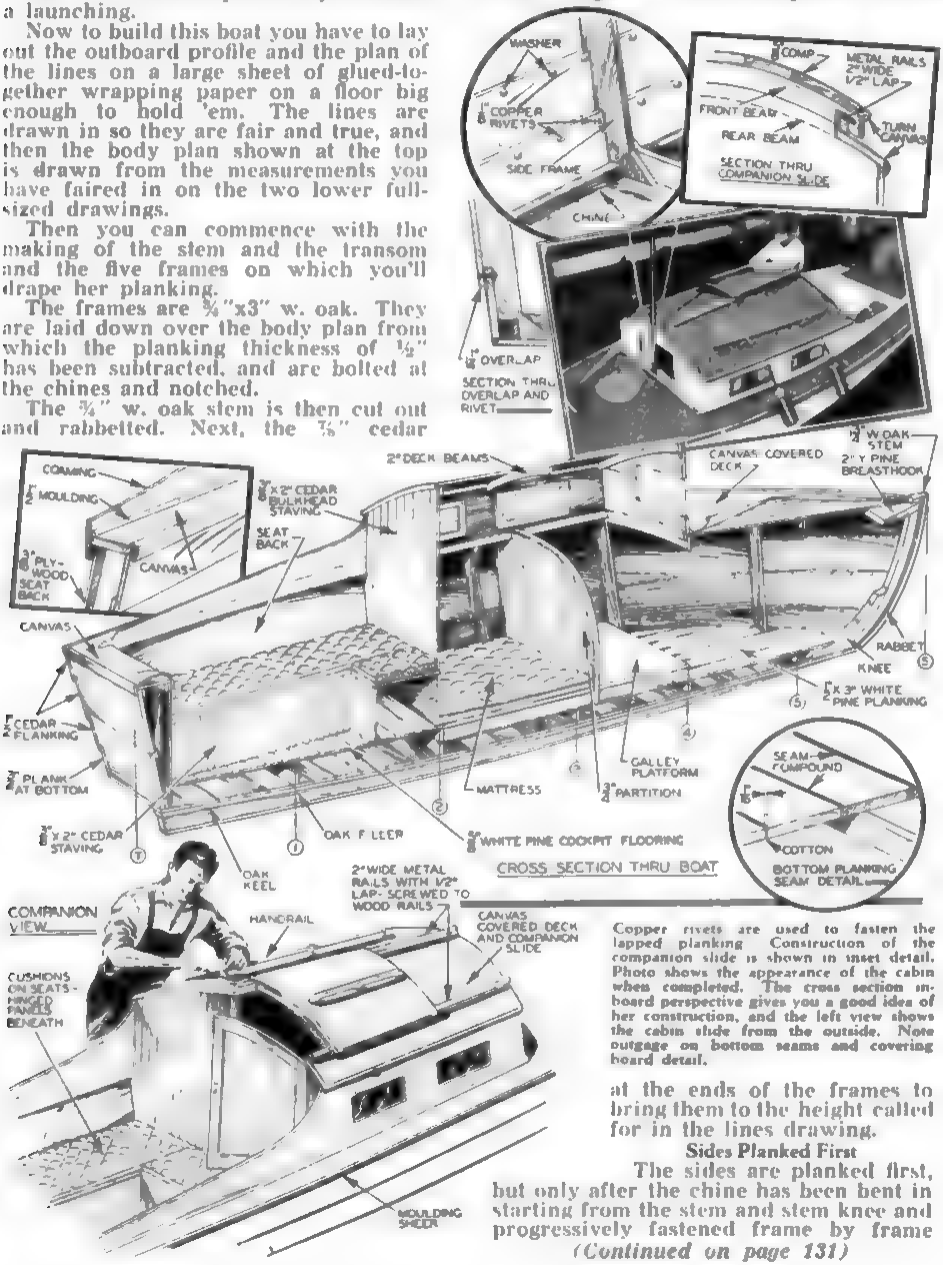
Now to build this boat you have to lay out the outboard profile and the plan of the lines on a large sheet of glued-together wrapping paper on a floor big enough to hold 'em. The lines are drawn in so they are fair and true, and then the body plan shown at the top is drawn from the measurements you have faired in on the two lower full-sized drawings.

Then you can commence with the making of the stem and the transom and the five frames on which you'll drape her planking.

The frames are ¾"x3" w. oak. They are laid down over the body plan from which the planking thickness of ½" has been subtracted, and are bolted at the chines and notched.

The ¾" w. oak stem is then cut out and rabbetted. Next, the ⅞" cedar transom is built and cleated on the inner face so as to form something which the planking can be nailed to.

Set these frames up on the floor, and tie 'em across the top so they won't pinch in when you bend the planking around. Extra lengths can be clamped or nailed at the ends of the frames to bring them to the height called for in the lines drawing.



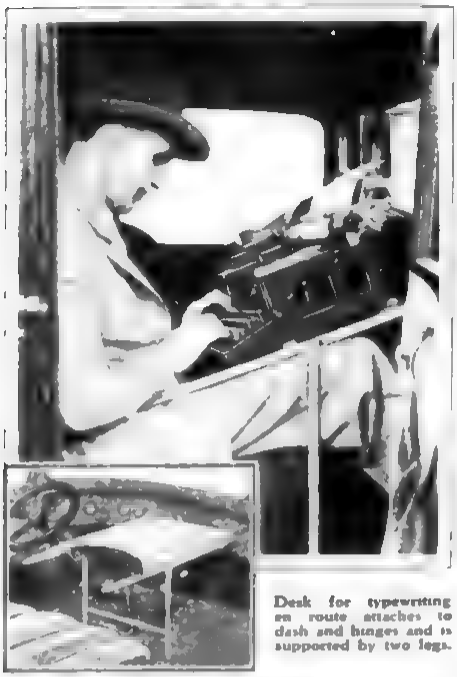
Copper rivets are used to fasten the lapped planking. Construction of the companion slide is shown in inset detail. Photo shows the appearance of the cabin when completed. The cross section inboard perspective gives you a good idea of her construction, and the left view shows the cabin slide from the outside. Note outgage on bottom seams and covering board detail.

Sides Planked First

The sides are planked first, but only after the chine has been bent in starting from the stem and stem knee and progressively fastened frame by frame

(Continued on page 131)

Table Holds Steno's Typewriter for Dictation En Route



Desk for typewriting en route attaches to dash and hinges and is supported by two legs.

THE itinerant motorist who has writing proclivities will find this gadget a useful proposition to help keep the stream of correspondence flowing home while he is spelled at the wheel by a fellow driver. With this dashboard desk one may type in the car either while at rest or while en route. The board itself, as can be seen in the illustration to the left, is made of fir plywood, rounded so as to bring its outer edges up under one's wrists. Short legs are used to help support the weight of the machine, and it is easily demounted from the dashboard by slipping the pins from the hinges on the dash.

When not in use the board is easily stowed out of sight behind a seat back or under the seat itself. A useful addition, not shown in the artist's sketch, would be a narrow wooden lip across the bottom to prevent the machine from slipping off.

Child Size Blocks Make Bridges

RECENTLY brought on the market by a California woodworking company is a set of child-size building blocks which can be used outdoors to make doll houses, child-size bridges, railways and other childishly imaginative structures. The set consists of blocks about four by six inches which are used in conjunction with flat boards that dovetail in proper relation to each other so that every imaginable kind of furniture and dwelling can be erected. No fastenings other than the lock joints are used. Picture below illustrates what can be done in the way of building bridges.

Handy Medicine Chart Keeps Time

HERE is a fine little help for the sick room especially useful for those who have to administer medicine at critical times and who have poor memories. A small card is simply ruled off with 12 lines, each line representing one hour. In between each of these lines another line representing a half hour is marked. Now after the medicine is taken, the bottle, which serves as the index, is simply placed on the card either at a point representing the time the medicine was last taken or indicating the time when the next dose should be taken. If this little helper is used, there will be little trouble forgetting time. Such lapse of memory is rather serious in the case of certain powerful drugs.

By marking a card with lines medicine is given at right time.

Kids can be kept happy for hours with these fascinating blocks, from which such ambitious projects as this bridge can be built. There are no nuts, bolts or screws to tear clothing. Any type of structure can be built, houses, railroads, etc.

Fortunes Waiting for Inventors

by

Raymond F. Yates

Fortunes in simple inventions are suggested by our Patent Editor each month. Many have found wealth by developing some of the ideas presented.

ONCE MORE the fact that President Roosevelt's Recovery Act is creating an unprecedented demand for new inventions and new ideas must be emphasized. Frantically manufacturers are searching about for things with which to stimulate their businesses and as a result we have today an acute shortage of inventions.

So the time to get busy is now; the time to cash in is TODAY.

It cannot be too strongly pointed out that this is the day of the small, simple invention; the little gadget that can be produced at low cost and sold in great volume. The rapidly expanding markets that are now under way do not permit the smaller manufacturers to fuss with costly ideas that require great investments in new machinery.

Quick Delivery Oil Container

Everybody knows how slowly lubricating oil runs out of bottles and other containers and how this causes loss of time at a gas station. In the winter an oil injection requires several minutes.

What is needed is a quart oil container that can be thoroughly emptied at high speed. Perhaps it should work on the principle of small squirt gun or atomizer, with a handle and plunger which would force the oil out under pressure. Naturally these containers cannot cost a great deal and the mechanism ejecting the oil should be inexpensive.

Customer's Gas Meter

Speaking of gas service stations there is needed a gas pump with two dials, one for the serviceman and one arranged on an arm that can be swung out so that the driver in the car may actually see how many gallons are placed in the tank. This second dial should operate from the first one by means of a small, non-slipping pulley or chain.

Those who have used garden hose know how messy it is when the nozzle is adjusted so that the spray feature is brought into play. Water invariably runs down one's wrists and legs. What is needed is a garden hose nozzle that can be regulated by means of a small lever placed on the end. The turning of the nozzle would then be entirely unnecessary and there would be no danger of the operator getting wet. The market for this little device would be very large and the inventor would make himself a great deal of money.

Non-corroding Door Bell

An electric buzzer or bell that will operate without contacts is in demand. In other words, a method of producing motion in an armature without making and breaking a circuit in the conventional manner. It is this feature of door bells that causes them to need attention because the contacts either corrode or become dirty. Such a bell would be worth at least one hundred thousand dollars to the very lucky man who could produce it.

Dripless Pitcher Lip

There must be some way in which water pitchers can be constructed so that they will not drip. If you do not think that such a thing would be a commercial success just ask some of the neighborhood housewives if they would buy a pitcher with a drip-proof lip. Five million would be sold in a single year. Twenty of the largest pottery and glassware manufacturers would bid their heads off for the rights to such an invention.

Handle-holder for Tea Kettle

The same background and the same set of conditions hold true for a tea kettle handle that will remain in an upright position where it will not become hot and will not char. The

(Contd. on page 132)

Editor's note: Questions of readers desiring advice on how to secure patents, on methods of procedure, or on ideas for inventions, will be answered when such requests are accompanied by a stamped, self-addressed envelope. Never send models as they cannot be accepted. Address inquiries to Patent Editor, Modern Mechanix and Inventions, 529 So. 7th St., Minneapolis, Minn.

S.W. ADAPTER Gets Police,

Short wave broadcasts, police stations, and amateurs are tuned in with the tuning condenser (center) and regeneration condenser (right). Make fine adjustments with vernier.

DAILY the number of short wave listeners increases. It will be but a short time until the number of listeners on the lower wavelengths will be as great as the number of listeners on the broadcast band when the DX craze was at its peak several years ago.

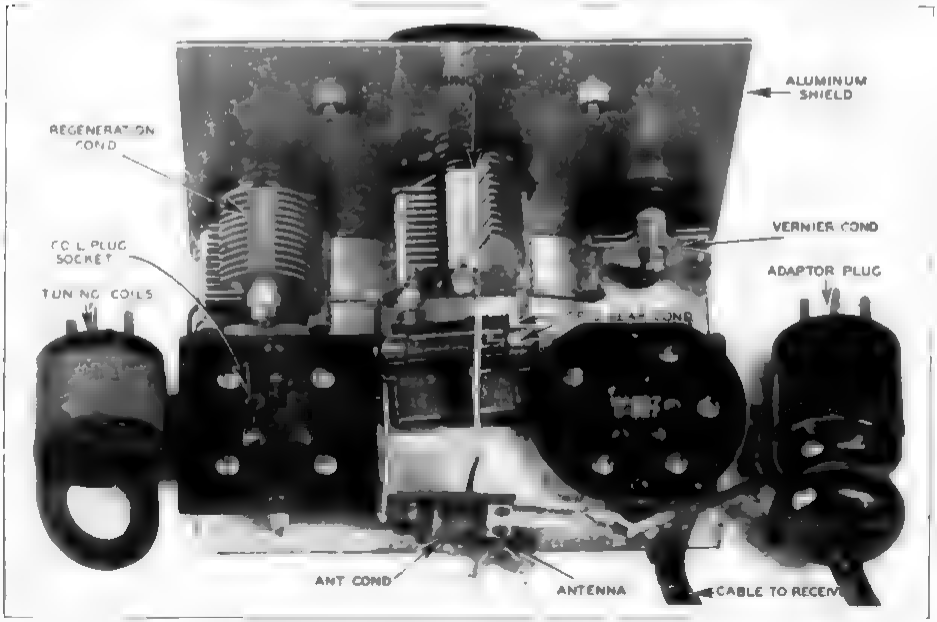
Although this information is not at all new to many short wave fans, they may nevertheless profit by it, and get a kick out of it by building this little adapter.

If your receiver has a hefty push-pull output you can expect to have a short wave receiver with plenty of pep. This little device, when used in conjunction with a broadcast receiver having but two tubes in the A. F., brought in all of the domestic shortwave transmissions, as well as five South and Central American stations and a host of European stations.

Police, ship to shore, airplane and ham transmissions are so numerous that they are passed by, but for the newcomer on shortwaves they offer plenty of excitement. If you have never had the privilege of listening to broadcasts which are really interesting and in most cases free from advertising, this adapter is what you want.

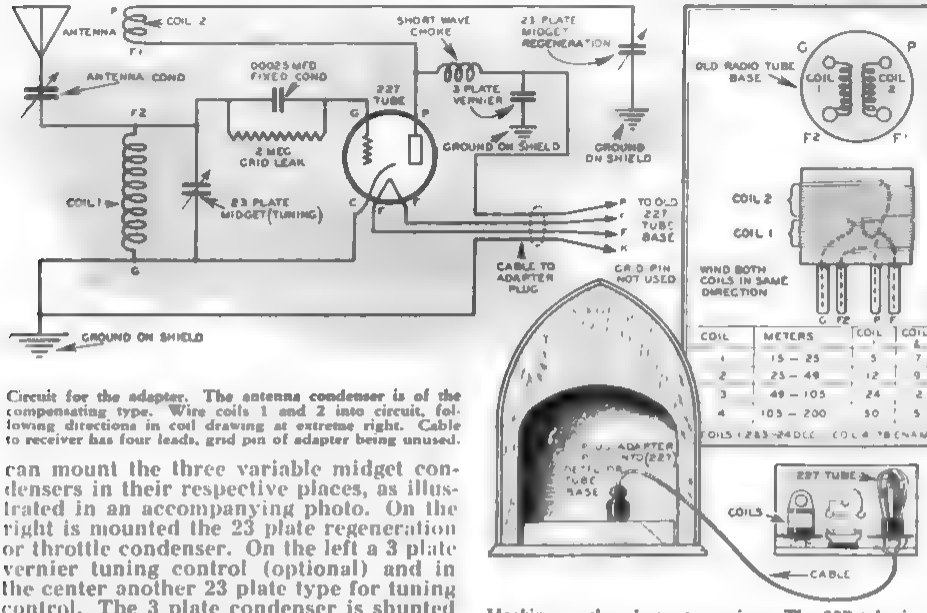
Now to start the actual construction of the adapter. Bear in mind that the sizes of the panel and sub-panel as given need not be carried out, since this set was built with small dimensions so as to make it easy to carry about.

After drilling the aluminum panel you



Arrange parts according to layout shown here, making all connections with bus bar wiring and keeping the leads short.

Amateurs, Foreign Broadcasts



Circuit for the adapter. The antenna condenser is of the compensating type. Wire coils 1 and 2 into circuit, following directions in coil drawing at extreme right. Cable to receiver has four leads, grid pin of adapter being unused.

Hooking up the adapter to receiver. The 227 tube is removed and inserted in socket in the adapter, while the adapter plug is inserted in the vacant base in the receiver.

can mount the three variable midget condensers in their respective places, as illustrated in an accompanying photo. On the right is mounted the 23 plate regeneration or throttle condenser. On the left a 3 plate vernier tuning control (optional) and in the center another 23 plate type for tuning control. The 3 plate condenser is shunted across the throttle condenser.

You will notice, after examination of the circuit, that the condensers are not insulated from the panel. Since the panel is in the cathode-gnd. circuit and the rotors of all three control condensers are also in this circuit, the panel acts as the connection to the three.

In the adapter described here wafer type sockets were used. They were mounted to the sub-panel with wood screws and raised to the proper height by ⅜" studs.

(Continued on page 127)

Electric Phonograph Pick-up Reproduces Records on Your Broadcast Set

IF YOU want a pick-up for the phonograph to the radio amplifier, you can make your own for only a few cents from cast off material about the radio room.

First, get an old stylus arm from a phonograph reproducer. Arrange this so it can be fastened securely to the side of a common headset phone as shown in the detail sketch below.

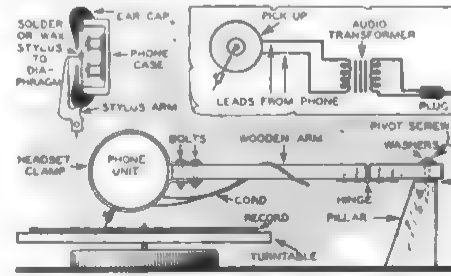
It will probably necessitate drilling and tapping a small hole in the side of the ear cap for the holding screw of the arm. This should allow the diaphragm pin to come in the exact center of the ear phone diaphragm. Scrape the metal diaphragm clean and solder the end of the stylus to it.

Now make a clamp of thin strip metal that will wrap around the earphone case and leave two horizontals parallel with each other about 1 inch long for bolting to the end of the wooden arm.

The arm should be about 2 inches shorter than a regulation phonograph tone arm, and is hinged as illustrated. When properly arranged, the arm will swing easily up and down on the hinge and turn easily from side to side on the pivot screw.

Wrap the phone wires loosely about the arm and lead them to the primary of a good audio transformer. Wire the transformer secondary to a plug suitable for plugging into the radio amplifier.

By using a suitable needle and good records, very good reproduction should be obtained.



Ear phone, with stylus arm attached, is seated in the headset clamp, the cord being wound around the wooden arm. The plug inserts in the amplifier circuit of the receiver.

Backaches Disappear With This New Wood Sawing Rig

This saw, working up and down in its wooden frame, saved its builder the tiresome work of cutting wood by hand. An old washing machine motor drives a pulley attached to an automobile crankshaft which applies the push-pull movement to the saw frame. This frame rocks on a bolt at the upper front end of the upright structure, as shown.

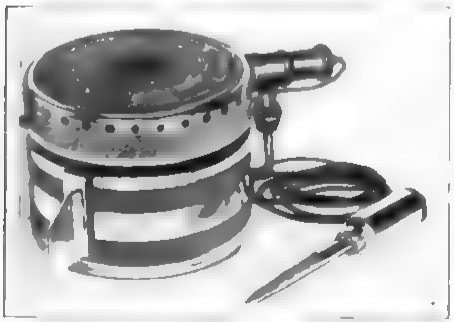
BACKACHES from sawing wood by hand with a buck saw led to the construction of the wood cutting rig shown in the photograph on the left.

A woodcutter in The Dalles, Ore., built the machine from spare parts found around his house. An old washing machine motor supplies the motive power to a wooden pulley. The pulley turns a discarded automobile crank shaft which gives the saw the necessary reciprocating movement. A connecting rod is attached to the crankshaft at one end and the other to the frame holding the saw. Springs in the end of the frame opposite to the blade keep the saw taut during operation.

No Terror in New Dental Drill

FEAR of the dentist's drill will disappear through the use of the instrument shown below. Manufacturers of the machine claim it will do away with the terrifying hum and the frightening sight of the long flexible shaft and motor of the ordinary drill. The new drill operates very quietly and is practically invisible to the patient, as the motor and all is held in the dentist's hand.

In addition to dental work, the drill may be used by mechanics for fine work on models. The machine can also be employed for certain kinds of engraving work.



Dental work loses some of its terrors with this new dentist's drill. Machine can also be used for drilling work on models, certain types of engravings, and as a draftsman's eraser.

Model Boat Travels 28 M. P. H.

A MINIATURE steam boat, developing 28 miles per hour in actual speed tests, was designed by J. M. Leonard, of Los Angeles, Calif.

The engine, built by T. Bernhardt, turns over 8,000 revolutions per minute in the water to drive the boat 28 miles an hour. A Butane burner allows a boiler pressure of 250 pounds to the square inch.

The completed model and its designers are shown in the photograph below.

This miniature steam boat developed a speed of 28 miles per hour in actual tests. The engine turns over 8,000 revolutions per minute while the propeller is geared to 10,500 revolutions per minute. A Butane burner produces a boiler pressure of 250 pounds to the square inch.

Melted Ice Stimulates Growth

MELTED ice to stimulate the growth of human beings may become a possibility as the result of experiments conducted by Professors H. T. Barnes and F. E. Lloyd, of McGill University, Montreal. The experiments have thus far been confined to lowly water animals.

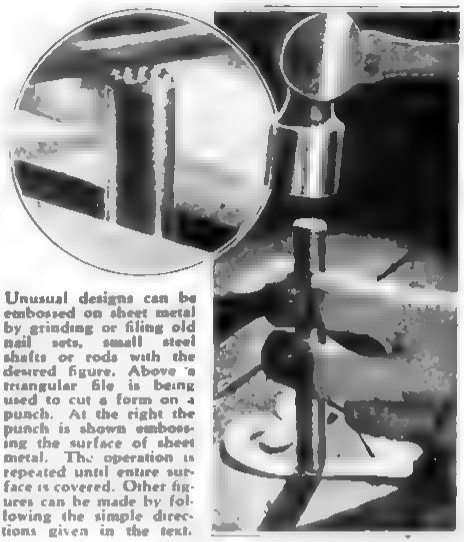
The discoveries of the McGill University professors have been confirmed in experiments on the Euglenia, a microscopic creature about half way between a plant and an animal in the biological scale.

Old Nail Set Makes Decorative Metal Surface Designs

DECORATIVE surfaces can be reproduced quickly and simply on sheet metal through the use of old pieces of steel shafting, rods, nail sets and the like. One end of the punch is engraved so that when held against the metal and struck with a hammer, as shown in the photograph, groups of rectangles, triangles or any other figures can be made by the mechanic or metal artist. Reproduction of the process over the entire surface of the metal results in an even design throughout.

The end of the steel rod is first ground or filed flat and then marked out with the design to be used. A three-cornered file is used to cut out the design, as shown in the inset of the photograph. The variety of forms available to the artisan is as endless as his imagination.

The punches can be used for considerable work without treatment after grinding and filing. To increase the life of the punch, it must be tempered, however.



Unusual designs can be embossed on sheet metal by grinding or filing old nail sets, small steel shafts or rods with the desired figure. Above a triangular file is being used to cut a form on a punch. At the right the punch is shown embossing the surface of sheet metal. The operation is repeated until entire surface is covered. Other figures can be made by following the simple directions given in the text.

Rack Simplifies Tank Repairs

The rack above makes welding and other work on cylindrical tanks much simpler. The rack is built of scrap tubing.

WELDING or other work on cylindrical tanks is much simpler when done on a rack such as shown in the photograph.

The rack is built of scrap tubing, welded at the bottom to two angle irons which are bolted to the floor. To accommodate tanks of varying sizes the horizontal tubings have short projections near each end. Iron pipes of lengths depending on the size of the tank can be slipped over the projections. Instead of welding the frame to the angle irons, the rack can be held together by bolts.

The photograph shows a chain with a coiled spring at one end and a foot lever at the other.

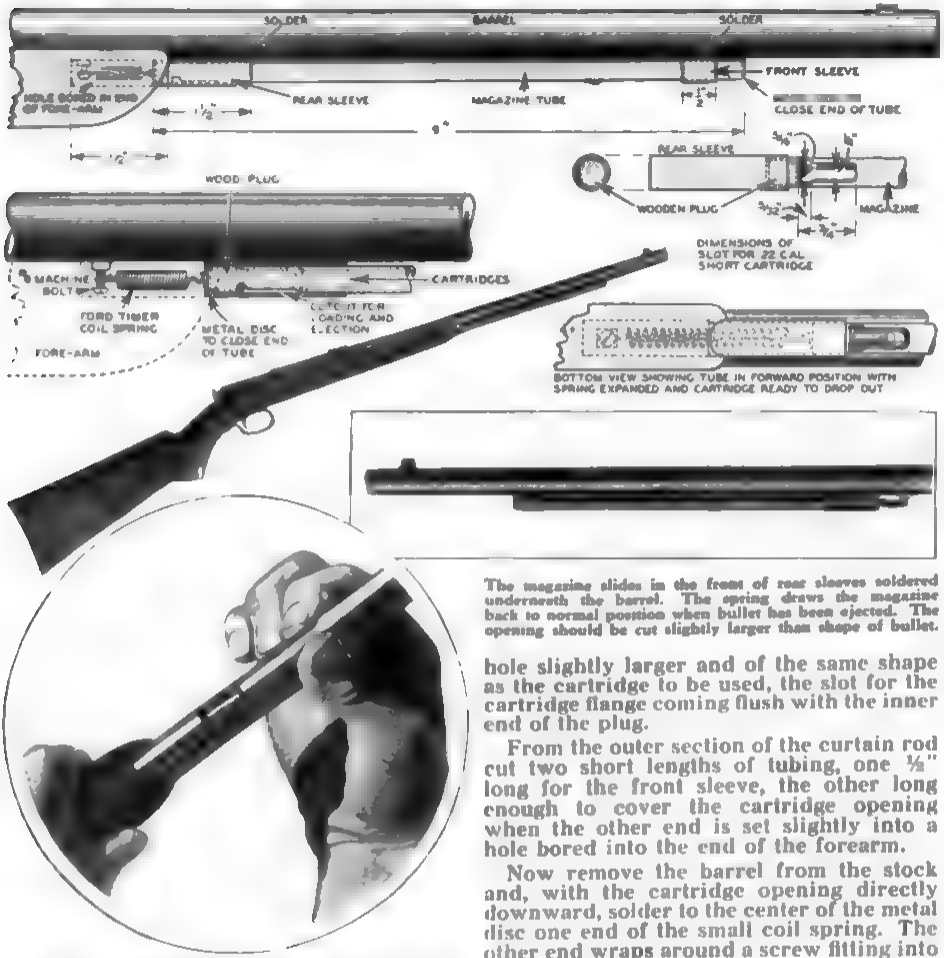
Builds Cruiser on Garage Roof

BUILDING a 32-foot cabin cruiser on a garage roof was the difficult task undertaken by George Purring, in Narberth, Pa. It was the only space available for the job.

Purring wanted to build his own boat, but could find no space at his home in which to construct his cruiser. Finally he discovered that the roof of the garage was large enough. Ingenuity aided him and the success of his work can be seen in the accompanying photo. The cruiser *Felice*, ready for launching, is being lowered from the garage roof by means of a derrick, built by Purring, to an automobile trailer that will take the *Felice* to the water.

A garage roof was the odd place George Purring, of Narberth, Pa., picked to build his 32-foot cabin cruiser, because he had no other available space. The cruiser is shown being lowered from the garage roof ready for launching

Magazine Makes One-shot Rifle Fast Firing



The magazine slides in the front of rear sleeves soldered underneath the barrel. The spring draws the magazine back to normal position when bullet has been ejected. The opening should be cut slightly larger than shape of bullet.

Bullets drop in your hand for firing when you slide the magazine forward slightly with the thumb and forefinger. Hold the barrel slightly above horizontal position, as shown.

THE continual annoyance of fumbling through pockets or cartridge box for ammunition when using a single shot rifle led to the construction of this simple, yet practical, magazine, which not only holds an adequate supply of extra shells, but drops them, one at a time, into the hand without taking the gun from your shoulder.

Chief materials required are an old curtain rod of the telescoping variety and a coil sprifig from a Ford timer.

A section of this tubing 9 in. long is cut off and one end closed with a small disc of sheet-metal and soldered. In the other end a round wooden plug about ¼ in. long is filled and glued in place. End is closed by another soldered disc.

Just at the inner end of this plug file a hole slightly larger and of the same shape as the cartridge to be used, the slot for the cartridge flange coming flush with the inner end of the plug.

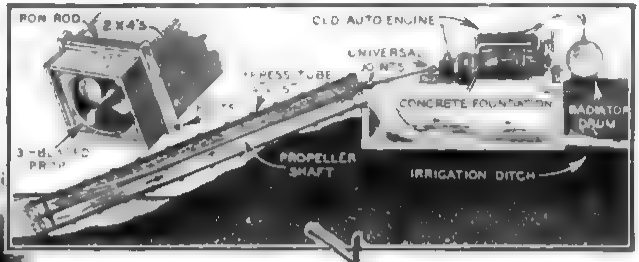
From the outer section of the curtain rod cut two short lengths of tubing, one ½" long for the front sleeve, the other long enough to cover the cartridge opening when the other end is set slightly into a hole bored into the end of the forearm.

Now remove the barrel from the stock and, with the cartridge opening directly downward, solder to the center of the metal disc one end of the small coil spring. The other end wraps around a screw fitting into a nut soldered to the barrel.

Reassemble the rifle and pull out on the tube until the cartridge opening is entirely exposed. Drop a tiny bit of solder on the tube at the inner edge of the forward sleeve. This is to act as a stop for the magazine.

In use, turn the rifle over with the muzzle pointing down, slide the tube forward and drop the cartridges into the opening, nose forward, until the magazine is full. Now turn the rifle over and, with the muzzle slightly elevated, slide the tube quickly forward and back. A single cartridge will be dropped into the palm of the hand. If the slot in the tube has been properly cut the cartridges cannot bind or jam but will drop out one by one as fast as the tube can be manipulated. To blue the magazine sponge on a solution consisting of 2 parts chloride of iron, 2 parts chloride of antimony, 1 part gallic acid and 4 parts water.

Irrigate Garden With Old Auto Motor



Cross-section view showing how the motor is mounted astraddle ditch on concrete foundation. Note cooling drum in front.

Tongue and groove cypress flume leads from stream up to irrigation ditch—a five ft. rise. Inset shows universal coupling between motor shaft and propeller shaft. Auto motor should turn up equal to 20 m.p.h. car speed.

Rear view of the project, showing upper end of the flume.

ON FARMS that fringe the Florida Everglades a new job has been found for discarded automobiles having engines that will still run, but which are too old for the road. The ancient machines are converted into efficient irrigation pumps.

Where permanent operation is desired, a wood or concrete foundation is built astraddle a ditch that leads to a stream, canal or lake, and the machine erected on the mounting after removal of wheels, fenders and other unnecessary parts.

Immediately behind the mounted automobile a rectangular tube is built of tongue-and-grooved cypress lumber securely fastened together by heavy cross members. Dimensions are seen in the drawing above. The automobile drive shaft is loosened at the rear axle end, dropped, and lengthened by the attachment of additional shafting and the installation of two universal joints.

The extended shaft runs down the cypress tube and terminates in a propeller which rotates in a circular opening at the lower or submerged end of the tube. Although a standard three-blade bronze motorboat propeller has been found satisfactory, more efficiency has been obtained with a six-bladed type constructed by a local blacksmith.

It was found that the standard radiator did not provide sufficient cooling action, so a steel oil drum was installed as a substitute. If the motor becomes too hot and the water boils, it is a simple matter to drain some of the hot water away and pour fresh water into the drum. The engine hood and fan are left in place to provide additional cooling.

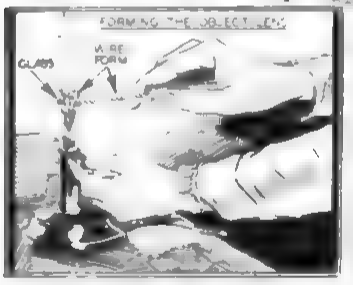
Magnetic After-dinner Cordial

THE high inflammability of after-dinner cordials is productive of some amusing tricks. For instance, ignite the cordial with a match, then suddenly clamp your hand down over top of glass, as in photo. When you lift your hand the glass will follow suit, to the mystification of your guests. Reason: partial vacuum created by the fire.

When flame is quenched, glass adheres to hand due to vacuum.

Microscope for Nature Study

Microscopic object to be viewed is placed on slide, which is then slipped under clamp on stage. To focus on object, adjust sleeve on tube, eyepiece, and objective. In circle at upper left corner is complete microscope.



Shape the wire holder for the object lens by twisting around nail. Soda glass tubing is melted over a bunsen flame, using portion midway between dark lower tip and the upper tip.

PEERING through the eyepiece of this medium-powered compound microscope, you get an amazing view of the life that exists down in the realms lying beyond range of the unaided human vision. Mysterious creatures swarming there dart about, collide, devour each other, and in general, present a fascinating spectacle.

Construction entails no great expense, and once you get the instrument assembled you will view a world you never dreamed existed when you examined your environment with your unsupported eyes.

The following describes a unique method of forming small object lenses used in the compound microscope. A complete microscope using these lenses is also described.

First procure a few feet of No. 32 nichrome wire, and some ¼-inch soda glass tubing. The glass must be perfectly clear and with no hair lines. (Do not use lead glass.) Make a circle of the nichrome wire about 3/16 inch in diameter by taking one turn of the wire around a drill shank, nail, large wire, or any metal piece of perfect circular cross section.

Twist the two ends of the wire tightly together for about an inch from the circle. Remove the circle from the drill shank, minding not to spoil its shape. Next place the wire between two smooth flat pieces of metal and squeeze in a vise. Now fasten the circular wire frame to some solid support such that it may be held in a bunsen flame.

That part of the flame to be used is the non-oxidizing part which is found midway between the dark lower tip and the upper tip. When it is certain that the plane of the nichrome wire circle is horizontal, carefully lay a piece of soda glass on the circle. The size of the piece of glass determines the focal length of the finished lens.

The thickness of the lens should be half

Easily Made for Few Cents

or more the diameter. The bulk of the raw piece of glass may be adjudged accordingly. With the wire frame and glass in position, the bunsen flame may be placed under the glass.

A bead will form and should adhere completely around the circle. The bead is to be left in the flame five minutes or more, after which it may be allowed to cool—a good, practical, short focal lens is the result.

The nichrome wire may be removed by first breaking at the junction by bending and then peeling off from the outside. Several of these lenses can be made, each time varying the amount of glass to obtain a selection of powers. The thicknesses of the set of objectives can vary from one-fourth to more than one-half the diameter of the lenses.

The eye piece lenses may be taken from small reading or magnifying glasses, from the eye piece of an old telescope or binoculars, or may be purchased direct from an optical store.

In selecting eye piece lenses the focal length of each much be between 1¼ and 2½ inches. The focal length can easily be determined by bringing the image of a light or window to focus on a white piece of paper and measuring the distance between the lens and paper.

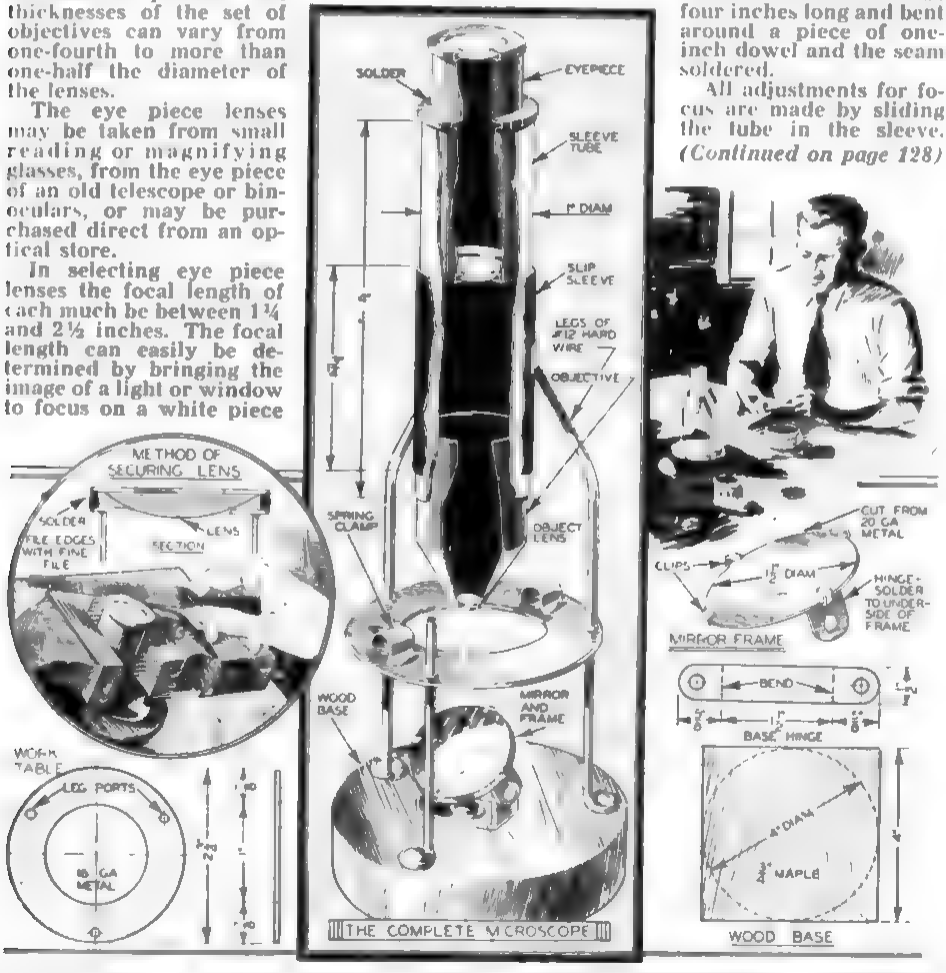
Now for the mounting of the various parts.

First cut a ¾-inch wood base about 4 inches square and bevel the edges. Upon this base are mounted three legs, each five and one-half inches long. Loops are bent at the bottom to accommodate ½-inch flat head brass screws. The other ends of the wires are flattened on an anvil so that they may be soldered to the slip sleeve, which is 1¾ inches long.

The sleeve as well as all other metal sheet parts is of No. 22 gauge soft or half hard brass, and is formed around the tube, which in turn should be four inches long and bent around a piece of one-inch dowel and the seam soldered.

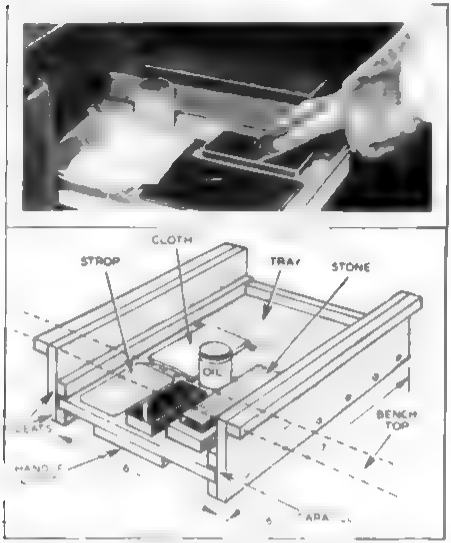
All adjustments for focus are made by sliding the tube in the sleeve.

(Continued on page 128)



No. 12 hard wire forms legs of the microscope tube. Slide rests on the stage and is held firmly in place by spring clamp. Object lens fits in conical tip of the objective. It's advisable to have several such lenses of varying focal lengths.

Whetting-tray Under Workbench Helps Keep Tools Sharp



Drawer, holding honing materials in position shown here, slides under the workbench with the cleats as guides.

A DRAWER-TRAY made to hold honing equipment for a shop protects the stones from grit and possible breakage, and in addition keeps the sharpening equipment in position for instant use.

The tray is a plywood board about 12 by 17 in., arranged to slide between cleats carried by side boards screwed to the underside of the bench top. A cleat under the front edge gives a hand-hold for drawing out, while one beneath the back edge, which stops against a screw in an under cleat, prevents the tray being pulled out too far.

Arrange on the board a coarse and a fine whetstone, a piece of leather for a strop, a salve jar for oil, and a wire rod for holding a scrap of cloth to wipe the blades on.

You'll find it advisable to treat the stone occasionally with a scrubbing of kerosene. This floats away the metal particles, yet doesn't leave the stone gummy as does ordinary oil.

Motor Powers Fender Straightener

THE hand method of taking bumps out of damaged fenders is now being replaced by a motorized method using a tool that applies 1400 hammer blows per minute. This new fender straightener consists of an enclosed motor which, through gear reduction, drives an eccentric that applies 2000 pounds pressure on re-shaping dies fitted into a U-shaped frame.

The damaged fender is placed in position between the two arms of this frame; the rapidly moving die in the upper arm strikes against the stationary die in the lower arm.

Applying 1400 strokes per minute at 2000 lbs. pressure, this tool removes bumps from fenders in short order, leaving smooth job. Dies are available in variety of shapes.

Truck Endgate Aids Unloading

Endgate drops down to form convenient unloading step.

A NEW endgate for automobiles makes life easier for the unloading crew, particularly when barrels are being discharged. The gate drops down to a position forming a step on which to rest the freight when bringing it down to the ground level. After the cargo has been unloaded the step is snapped back into position as an endgate again.

The arrangement is particularly adaptable to brewer's wagons and other vehicles hauling barrels, large packing cases, etc.

Alboline Prevents Match Marks

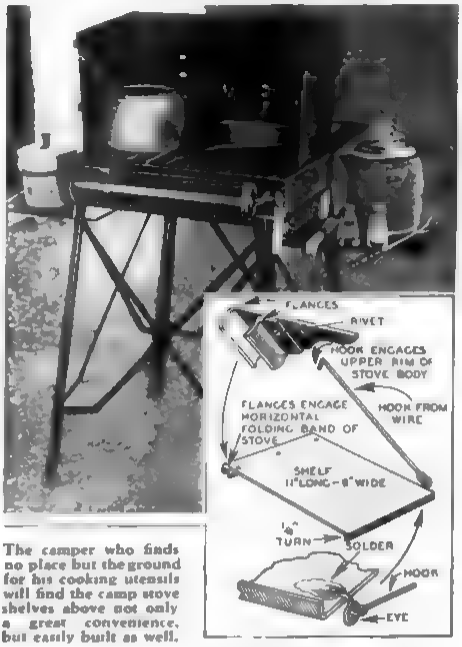
TO PREVENT match marks on a painted surface dip a bit of flannel in alboline (liquid vaseline) and go over the surface, rubbing it hard. A second rubbing with dry flannel finishes the job. On this treated surface you can scratch all day and neither get a light nor make an unsightly mark. Walls already defaced by matchmarks can be cleaned by scrubbing with soap.

No Place for Extra Pots? Use Shelves on Camp Stoves

THIRTY cents original cost for five dollars' worth of conveniences on every camping trip is the worthwhile result of building detachable shelves for your camping stove.

Once built the shelves eliminate the inconvenience of running around looking for a place for the fork and knife, salt and pepper shakers, and extra pots that usually end up on the ground. A little cutting, bending and soldering will place these shelves at your disposal.

The photograph and drawing illustrate their construction and use. The shelf is made of sheet iron cut to the dimensions given. One end is turned over a quarter inch to increase the strength and rigidity of the shelf. The other end is bent to form one flange. The other flange is also made of sheet iron and riveted to the shelf. The supporting flanges slip over the horizontal band of the standard folding gasoline camp stoves.



The camper who finds no place but the ground for his cooking utensils will find the camp stove shelves above not only a great convenience, but easily built as well.

These tools for crimping sheet metal rain and stove pipes can be made in a few minutes' time. All that is required is a grooved cylinder, a hardwood die, and a hammer.

Pipe Crimp Made in Few Minutes

TWO pieces of wood and a hammer are all that are needed to crimp rain pipes, stove pipes and other sheet metal tubing.

The tools consist of a hardwood cylindrical block grooved for the crimping, a hardwood die, and the hammer. The groove in the cylinder is cut out with a chisel. The cylinder should be small enough to permit the pipe to move freely.

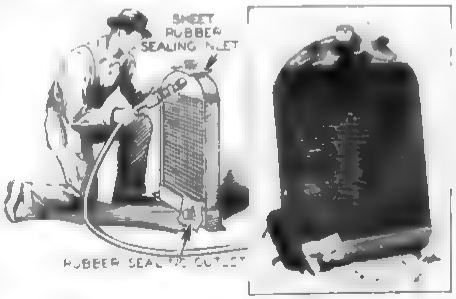
Fix the cylinder in a vise. Slip the pipe over it with the edge of the block protruding slightly so that the die can be placed quickly over the groove.

Inner Tubes Show Radiator Leaks

THAT old inner tube will help you find and plug the leaks in your automobile radiator.

Simply cut out pieces about four or five inches square from the inner tube. Slip them over the lower outlet and the upper neck. Put a hose clamp over each, tightening it until a water-tight job is assured.

A hose of running water clamped to the upper inlet fills the radiator with water and produces sufficient pressure to reveal the smallest leak. Each leak can be marked, the water poured out and the leak soldered. After soldering, refill the radiator to make sure the leak has been thoroughly plugged.



Pieces of inner tube used to seal openings in an auto radiator quickly show any leaks. The leaks can be marked, soldered, and retested in a short time with this arrangement.

A VOLTAGE Regulator

by **JOHN S. CARPENTER**

With this voltage regulator on the job, you simply set your water gate to carry the heaviest load you expect to get for the next few hours, then go away and forget the whole works. The juice will remain steady at 125 volts day and night.

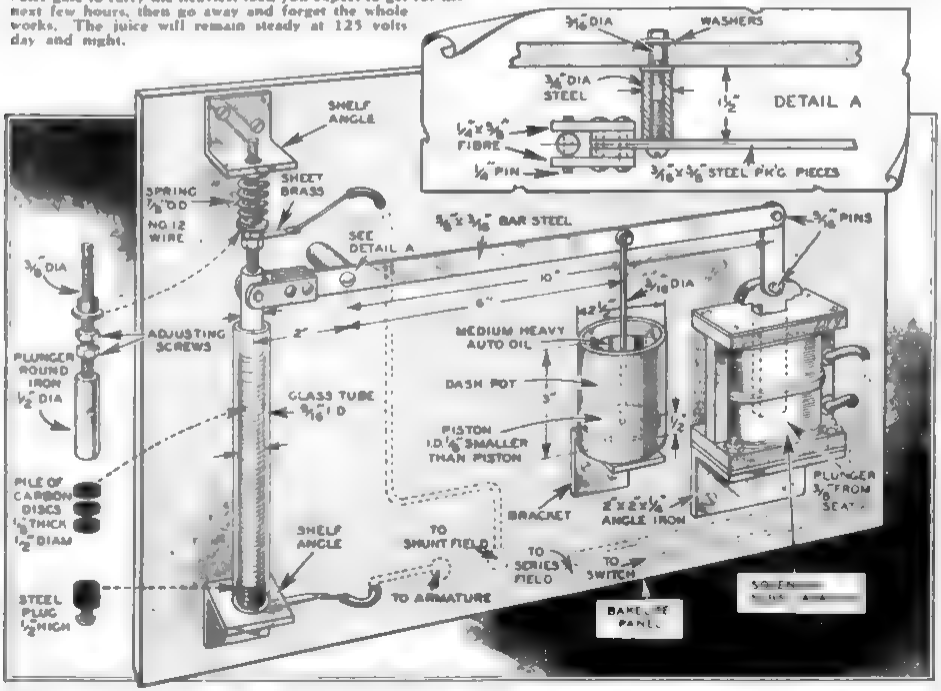
NUMEROUS inquiries for an "automatic rheostat" for the direct current generator of the farm water wheel shown in May MODERN MECHANIX AND INVENTIONS induced me to design a simple voltage regulator for the hydro fans.

Without a regulator, should the load be entirely thrown off, the wheel speed and the generator voltage would increase to about 85% above normal and you'd be getting 230 volts instead of 125. Light bulbs would blow up and motors or heating devices left on the line would be severely damaged.

So here's a regulator that will keep the voltage practically constant no matter what happens to either the load or speed. It works almost instantaneously, so that you don't have to sprint to the wheel gate and close it down or adjust a field rheostat with jittery fingers.

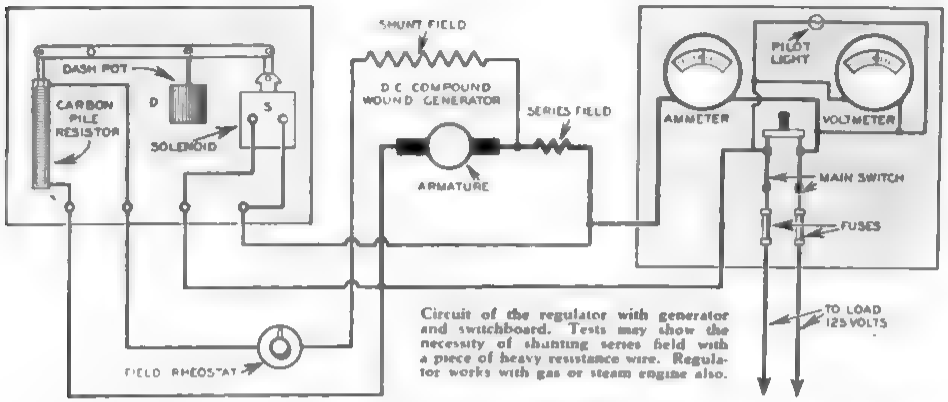
The characteristics of direct current compound machines vary so widely and their response is so different, that I cannot give hard and fast rules for the size of the resistor. But a few general instructions will show you how to build a good regulator for any direct current generator up to 5 KW.

Referring to the wiring diagram, a direct



Regulator is mounted on a bakelite or slate panel, and attached to generator switchboard. Dash pot filled with oil prevents too rapid vibration of the plunger in the solenoid. Wire to generator according to circuit shown on opposite page.

for Water Wheel Generators



Circuit of the regulator with generator and switchboard. Tests may show the necessity of shunting series field with a piece of heavy resistance wire. Regulator works with gas or steam engine also.

current compound wound generator is shown with switchboard and voltage regulator connections. The regulator is connected in series with the usual field rheostat. The solenoid S takes current from across the line, and by varying the pressure on a long pile of carbon discs, the resistance in the shunt field circuit is varied to control the delivered voltage. Shunt wound machines can be very easily controlled by this regulator without any change in design or circuits.

Referring to opposite page, my solenoid is a 5 lbs. capacity, G. E. make, with the plunger ⅝ inch away from its seat. Be sure to have a non-magnetic seat for the plunger so that it does not stick fast.

Carbon Pile Is Resistor

The resistor is made up of two shelf angles, the glass tube, a pile of carbon discs with spring loaded plunger. The lower shelf angle has a steel plug projecting ½ inch into the tube for centering the pile. The action of the plunger is readily seen. It is of ½ inch round iron drilled and threaded for adjusting screws. The spring should be of steel, ¾ inch O. D., at least six full coils, of No. 12 (.105) wire.

The spring should be screwed up sufficiently to balance the solenoid pull and the weight of parts at 125 volts. Some adjustment up or down of 125 volts can be obtained. If your line is long and skimpy on copper, you can run the generator at 130 volts by the screw adjustment in order to help out excessive line voltage drop.

Make the carbon pile discs from ½ inch diameter arc light carbons. They are best cut off in the lathe, about ¼ inch thick, using a piece of hacksaw blade wedged inclined in the tool holder. As you may break a dozen or so of discs before you get the trick of making them, have plenty of stock handy. The glass tubing should be heavy walled. The rest of the details are obvious.

To adapt this regulator to your generator and to secure the proper action will require a few tests which are usually thrillers. Start with a pile of discs 6 inches long in the glass tube.

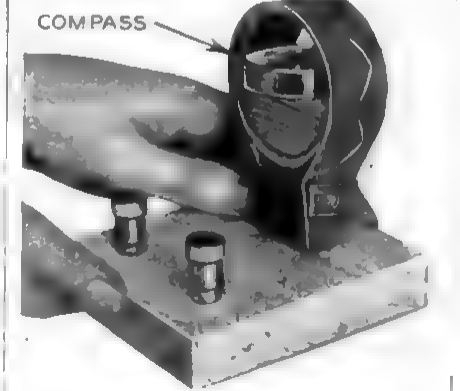
The first test is the overspeed test or run-

(Continued on page 129)

Galvanometer for Experimenters

ELECTRICAL experimenters can make good use of this simple, yet surprisingly efficient, galvanometer. Chief parts it's made from are a honeycomb coil and compass, mounted as illustrated in the photo. Wires lead to the honeycomb coil terminals through the binding posts. When a current flows, the needle of the compass is deflected in degree according to amount of juice passing.

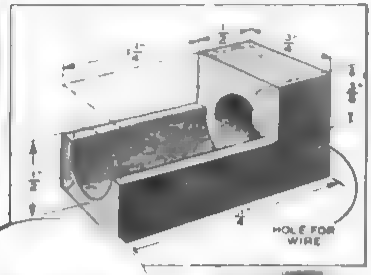
Minutest current can be detected with this home-grown galvanometer, though you will have to calibrate it with a manufactured instrument.



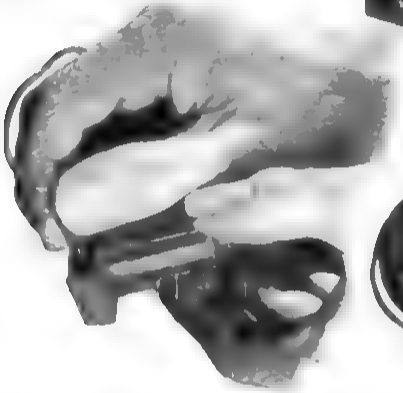
When current flows through the honeycomb coil above, compass needle is deflected to indicate juice passing.

Miniature Lights Illuminate Odd Corners

The midget lights may be installed in corner of book-case compartments to illuminate titles of the tomes as shown.



Dimensions for the socket for the bulb are given above. Materials needed to construct system are pictured at left.



Wire which makes contact with shell of the socket is inserted in the hole in side of block. This wire also serves to hold the little bulb firmly in place as long as it's in use.

Base contact in tube makes contact with this spring brass strip on the base of the block. Wire wrapped around the nail leads to the transformer.

The lighting circuit. Transformers will handle five bulbs.

WITH a miniature lighting system that you can make without difficulty, you can illuminate a bookcase, provide night lights for several rooms, or do a dozen other jobs of lighting where great intensity is not desired.

The system consists of a doorbell transformer rated at 6 to 8 volts, a quantity of doorbell wire or other type of similar size, five or six Mazda 40 radio dial light lamps, rated at 6.3 volts, and an equal number of sockets which you can purchase or make.

The bulbs are held in a combination socket and reflector that you can make from walnut, maple or other wood. First cut a block to measure about ⅞ x ⅞ x 1¾ in. Drill, lengthwise, a ½-in. hole to a depth of ⅞ in. Then change to a ⅜-in. bit and complete the hole. The threaded base of the bulb will fit snugly in the ⅜-in. part.

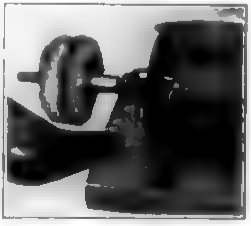
Split the block with a saw as far as the ½-in. hole runs, and then make a right-angle cut to remove one of the halves. This leaves a projecting shield for the lamp. Over the end of the small (⅜-in.) hole fasten a strip of spring brass or bronze.

In the side of the wood block drill a small hole to receive the end of a piece of stranded wire, such as radio hook-up wire. One side of the transformer secondary is connected to this wire, and the other to the nail that holds the spring brass strip on the end of the wood socket.

Push the stranded wire through the hole in the block, spread the ends apart so that they lie against the inside of the ⅜-in. hole, and push the bulb into place. It will fit tightly enough to remain indefinitely.

Rapid Electric Shoe Polisher

A FRACTIONAL horsepower motor, equipped with a grinding wheel arbor on which is mounted two soft buffing wheels, will keep your shoes always shining with only a few minutes' work.



Aquatic FREAKS Rout Summer Heat

Trick Outboards in Filmland

MOVIE folk are great at cooking up the unusual and extracting the last bit of publicity value from their stunts. And one of the latest of these gags is one which intrigues the mechanically-minded man who is addicted to taking his swimming seriously. Warren Williams, famous Warner Brothers film star, appeared at a California beach recently with the queer craft shown in the photo to the right.

The boat is propelled by an outboard motor (evidently a real amphibion!) and the hull consists of nothing more than an old inner tube of sufficient displacement to support the motor, an improvised seat, and some portion of the swimmer's weight.

We cannot say whether this is a practicable proposition, as we have been stung on screen publicity gags before; so take your choice. We ourselves won't bet on it as anything but a press agent's dream!

Though the contraption might actually propel the swimmer, vibration of the motor and propeller possibly might be unpleasant. Another difficulty would be starting the motor. A companion would have to take care of that, but if the water tourist became stalled some distance from land, he'd be up against a job of hand rowing.

Warren Williams, noted screen star, shows what the well-dressed swimmer will wear, if he is seeking publicity!

Water Swing Ducks Bathers

Extensively extendible log rolling device shown in photo above is the latest British innovation in swimming mechanics.

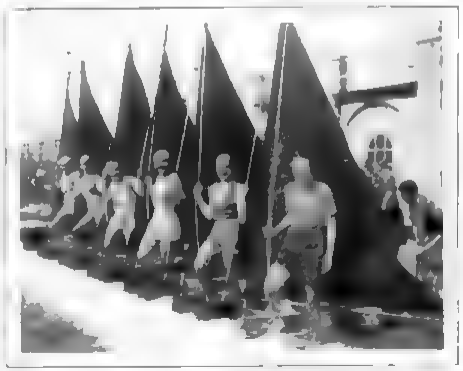
THE English may be slow to see the point of a joke but when it comes to rigging up a new thriller for water sports they are off at the crack of the gun.

The photo above shows three London mermaids having a "ducky" time at Highgate Pond on a new device introduced there this season. It consists essentially of a ballasted steel drum on which is mounted a ladder. The trick seems to be to see how high one can climb before the apparatus tips and deposits the aspiring steeple jack into the drink.

Sail Racing Latest Swank

ALWAYS in quest of something new in the way of diversion, the craft of the natives of Equador is seized upon by the ladies of the fashionable Lido Country Club to furnish something different in the way of water sport. The line up is for the inaugural of the Woman's Surf Sail Regatta at this famous eastern resort. These balsa catamarans were originally used by the natives of Equador for water transportation.

The sail boats simply consist of two light pontoons and the single mainsail. The pontoons are held together by cross pieces. The mast is set in the forward crosspiece.



The smart set aquatic queens introduce surf sail racing at the fashionable Lido Country Club in Florida.

Weave Crepe Paper Into Modish and Inexpensive Hats

A fair sample of what you can do in the way of making a modish hat from strips of crepe paper. Attractive, isn't it?

THE paper makers have a new idea in hats—a crepe paper top piece which looks exactly like the rough straw hats worn by men in the summer time.

The idea is to cut the paper in half-inch strips, stretch or twist them slightly, and crochet as with yarn or thread. The simple single crochet stitch yields the woven effect.

With a perfectly plain crown and an extra band you can make a sailor, a fez—and then there is the beret type. From a straight band crocheted 6½ inches deep and head size around, you can shape various peak types by draping, folding and tacking in different ways.

Take a look at the photo at the left to see what a crepe paper hat looks like!

Keep Photo of Deceased on Grave

PORTRAITS on tombstones are a decorative idea that is being put into practice throughout the country.

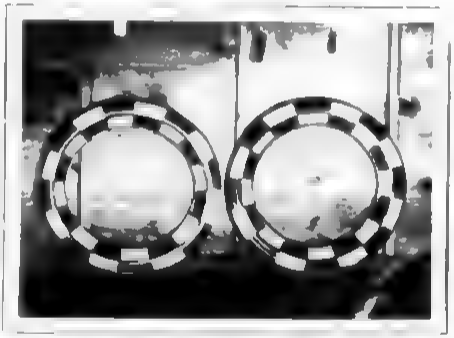
Consult the photo below to see how the idea is worked. A photo medallion of the deceased is cut out and inserted in a frame carved in the headpiece. The photo is then inserted and cemented in place.

A window of heavy isinglass, cemented, with a good grade of transparent waterproof glue, will preserve the photo for years and years against the ravages of time and weather, making a lasting memento to the one whose grave is so marked.

Photo medallion is cemented in frame carved in tombstone. A window of isinglass will preserve the picture against ravages of weather for many years.

Garage Bumper From Old Tires

TWO old tires nailed or leaned against the back wall of the garage make a very effective bumper. Many jolts and scraped nickel plating spots (with resultant rusty areas) will be avoided. Painting the tires black and white in a checkered design, as shown in the illustration, adds greatly to their appearance and actual utility as a warning sign.



Tires which have seen better days are painted in checkers and nailed against the side of the garage to guard the metal parts of the car from scrapes and bruises.

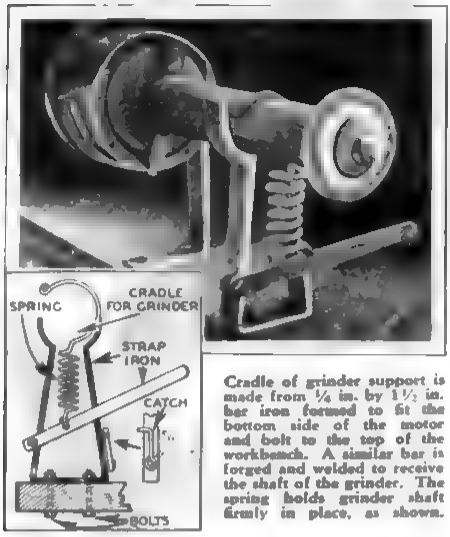
Removing Iodine Stain From Ring

IT OFTEN happens that in applying iodine to hand and finger cuts, some of the stain gets on a gold finger ring. To one who does not know how to remove such marks, this is a rather serious occurrence, for the beauty of the ring will be destroyed until the stain wears itself off.

In such cases, the person desiring to remove the stain should go to the drug store and buy one ounce of sodium bisulphite. This should be dissolved in about three ounces of warm water and the ring should be placed in the resulting solution until all traces of iodine have disappeared.

This method removes the possibility of having the ring injured by rubbing with coarse soaps and abrasives.

Converting Portable Grinder Into Stationary Machine



Cradle of grinder support is made from ⅛ in. by 1½ in. bar iron formed to fit the bottom side of the motor and bolt to the top of the workbench. A similar bar is forged and welded to receive the shaft of the grinder. The spring holds grinder shaft firmly in place, as shown.

IN THE small workshop a portable electric grinder may be made to serve as a stationary machine as well by equipping the workbench with a bracket like that shown here.

One section of ⅛ in. by 1½ in. bar is formed to fit the bottom side of the motor and bolt to the top of the workbench. A similar piece is forged and welded to receive the shaft of the grinder.

To one member of this bracket is loose-bolted a short lever, with a coiled spring attached. The end of the spring is formed into a hook which clasps the shaft and holds it down when the lever is depressed and hooked under a pin on the other member of the bracket. Only an instant is required to secure or release the grinder.

Throws Flashlight Beam Anywhere

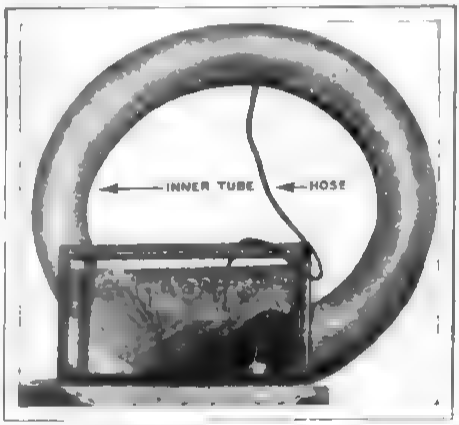
FOR the motorist or the camper, this ball and socket base will be found very handy when you want to direct a light over a certain area, and yet have no helper to put it there.

The base is a block of metal (lead is good) of any suitable weight or size available. To this is bolted or soldered a U-like piece made of 1/16 in. iron stock. The ball is held as shown.

To the iron ball solder a bolt which screws into a suitable nut soldered into the bottom of the flashlight, to hold it in place when you need a light.

Light is directed where you want it by clamping wing nut.

Old Inner Tube Aerates Aquarium



Hose to aerate the aquarium attaches to the valve of the inner tube, the free end resting on the bottom of the tank. Fill up inner tube with air—it exhausts into water to put new life into the H_2O cells.

BELIEVE it or not, but an old inner tube will prove surprisingly efficient at the job of aerating your aquarium.

How this unique stunt is performed is illustrated in the photo above. From the valve on the tube, a hose leads down into the water in the tank, the end resting on the bottom. A special valve on the end of the hose allows the air to escape slowly to rejuvenate the aqua.

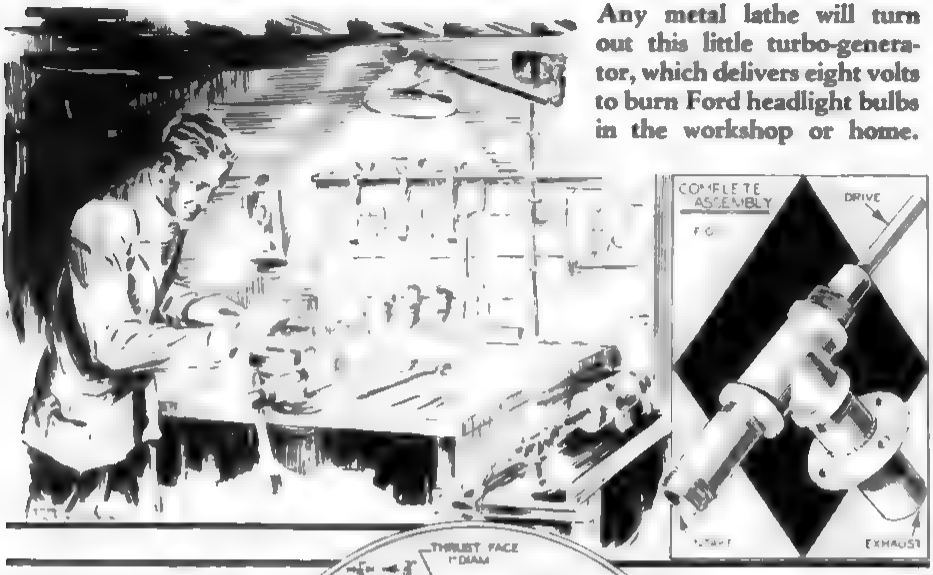
When ready to aerate, pump up your inner tube to full and it will bubble for a surprisingly long time in the water.

Powder Replaces Soldering Acid

ACIDS are unnecessary with a newly invented compound that cleans the metal and holds the solder in a single operation. Successful tests with the compound have been made on such difficult metals as brass, copper, pewter, pot metal, cast iron, and steel. The powder is called "Tin-Ezy."

Midget TURBO-Generator

Any metal lathe will turn out this little turbo-generator, which delivers eight volts to burn Ford headlight bulbs in the workshop or home.



A Ford Model "A" generator, turned by turbine, delivers sufficient juice to burn a Ford headlight bulb over your workbench. With turbine turning over 2,000 r. p. m., and working under 65 lbs pressure, the generator delivers eight volts at twelve amperes, or nearly 100 watts.

Fig. 1. Turbine is mounted on baseboard by means of the collar on exhaust pipe.

HERE is a small water turbine made from 1-inch pipe fittings and some brass rod that will drive a Ford Model "A" generator and furnish either light or power on a small scale for various household or workshop uses. If you want lights alone, you can get Ford headlights, focus them for the lighting effect you want and light your small shop. If you do battery charging on a small scale, this rig, working under moderate pressure, will deliver the current very satisfactorily.

The turbine will work on city water pressure where the street pressure is 60 lbs. or more, and the house supply pipe is at least ¾ inch. Care should be taken to select a place for the turbine near where the water pipe comes into the house.

By means of the third brush, the speed and voltage of the generator can be adjusted within very wide limits. The turbine should be mounted on a piece of oak, and coupled directly to the shaft of the Ford generator, as in Fig. 5.

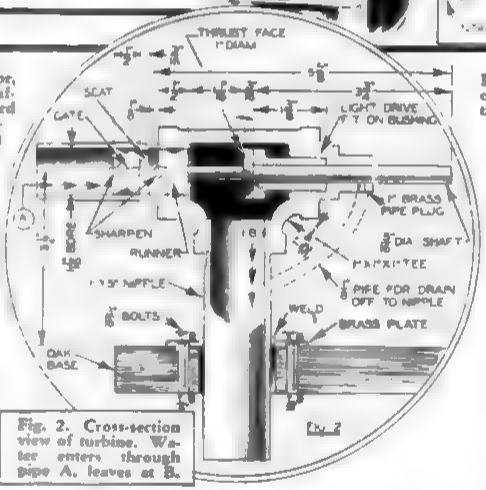


Fig. 2. Cross-section view of turbine. Water enters through pipe A, leaves at B.

You can make a very fine coupling out of a piece of 1 7/16" diameter steel shafting 2½" long. Setscrew the coupling to the two shafts using ¼-in. cone point set screws. So much for the general ensemble.

To make the turbine, you will want to get a 1x-1x1-inch malleable or cast iron tee suitable for plumbing work. Also, a 1x3-inch steel nipple for the water inlet, then a 1x5-inch nipple for the water discharge—A and B respectively, on Fig. 2. A 1-inch brass pipe plug makes part of the bearing sleeve.

From a machinery supply house you will require 1 piece of 1¼-inch brass rod just about a foot long, counting waste, chuck holds, etc. Also a piece of ⅛-inch brass plate 3 inches square. Those items complete the list.

On account of the fact that pipe fittings vary somewhat in dimensions, being made by different shops, precise dimensions cannot be given for machining the 1x3-inch

Lights Home or Workshop

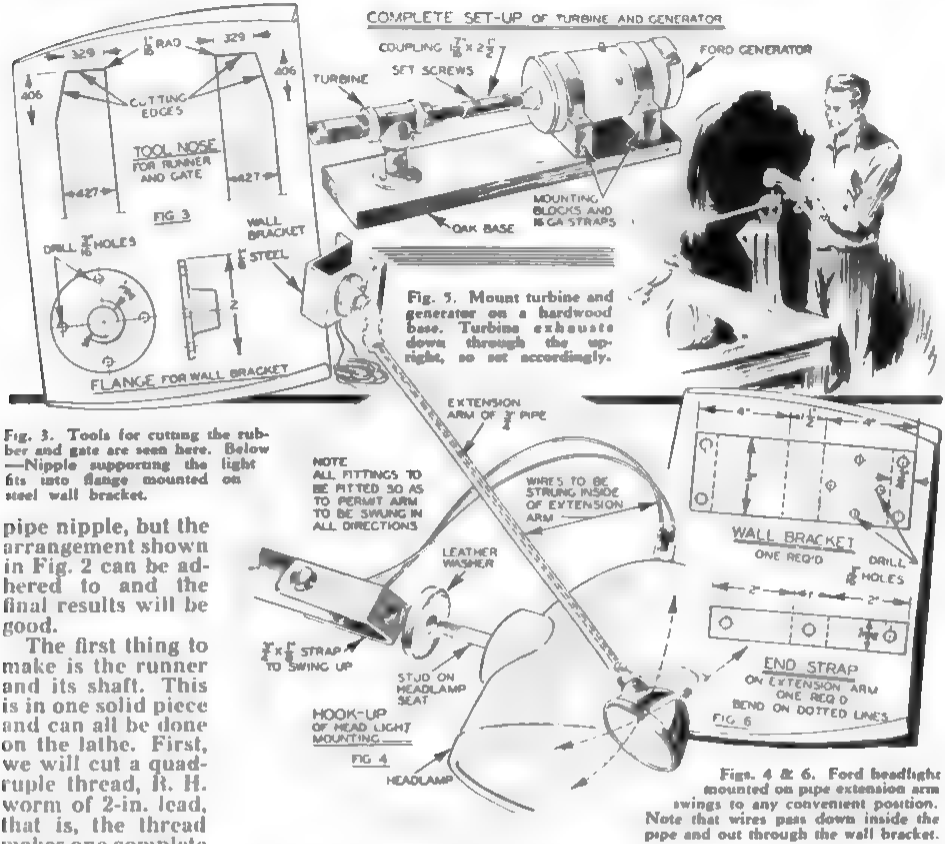


Fig. 5. Mount turbine and generator on a hardwood base. Turbine exhaust down through the upright, so set accordingly.

Fig. 3. Tools for cutting the rubber and gate are seen here. Below —Nipple supporting the light fits into flange mounted on steel wall bracket.

Figs. 4 & 6. Ford headlight mounted on pipe extension arm swings to any convenient position. Note that wires pass down inside the pipe and out through the wall bracket.

pipe nipple, but the arrangement shown in Fig. 2 can be adhered to and the final results will be good.

The first thing to make is the runner and its shaft. This is in one solid piece and can all be done on the lathe. First, we will cut a quadruple thread, R. H. worm of 2-in. lead, that is, the thread makes one complete revolution in 2 inches, and the pitch is ½ thread per inch.

This makes an interesting problem in screw cutting and you'll be surprised how easy it is to cut a special type of helix. Most lathes have lead screws of 6-pitch and we will see how the gears are figured out, so if your lathe is different you can figure what gears you will need.

Some gear sets vary by 4 teeth and others by 5 teeth. Multiply the leadscrew pitch by a given number and then multiply the pitch of the thread to be cut by the same number. These products will be the number of teeth in the required gears, if you happen to have those. If they are not in your set of gears, try other numbers that will make numbers in your set.

For example, suppose we have a 6-pitch leadscrew and the thread to be cut is ½ pitch. Multiplying both by 24, we get 144 and 12, which may or may not be in our gear set. If you didn't have a 144 tooth gear, you can compound it by using a 72 tooth and a 2 to 1 compound gear, remembering that the leadscrew must turn faster than the work when the thread to be cut is coarser than the leadscrew pitch.

A little study of the helix to be cut shows that it is straight on the front face and that it is of equal thickness. To do this we must grind up a special cutting tool as shown in Fig. 3. The bevel is all on one side and the tool will have to be ground for more rake and clearance below, as the work progresses inward to the ½-inch diameter spindle.

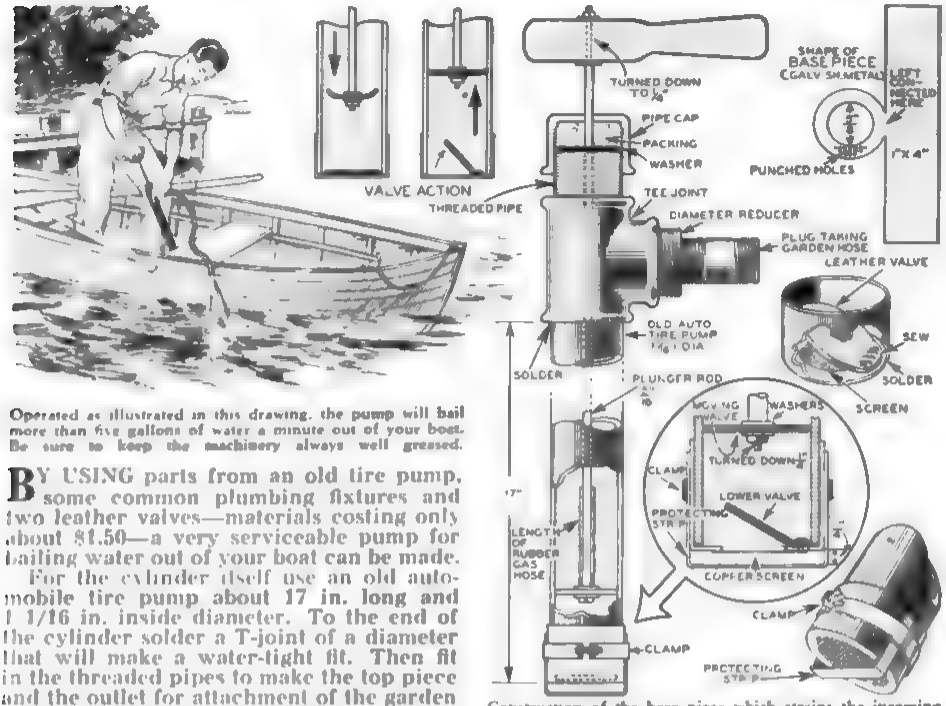
With a little care that will give no trouble. On the outside diameter of 1.0625 inch, the angle of helix is nearly 31 degrees, so the tool can be started with that maximum amount.

After cutting the first thread down to full depth, we must either index the work, moving it exactly 90 degrees or what is the same thing, we can move the carriage after the feed nut is opened while the spindle is, of course, stopped.

We must move the carriage the distance

(Continued on page 130)

A High Capacity Bilge Pump for $1.50



Operated as illustrated in this drawing, the pump will bail more than five gallons of water a minute out of your boat. Be sure to keep the machinery always well greased.

Construction of the base piece which strains the incoming water is seen in circle. Note bumper clamped on bottom.

BY USING parts from an old tire pump, some common plumbing fixtures and two leather valves—materials costing only about $1.50—a very serviceable pump for bailing water out of your boat can be made.

For the cylinder itself use an old automobile tire pump about 17 in. long and 1 1/16 in. inside diameter. To the end of the cylinder solder a T-joint of a diameter that will make a water-tight fit. Then fit in the threaded pipes to make the top piece and the outlet for attachment of the garden hose as illustrated in the drawing.

Both the valves are made of heavy leather. The stationary valve is round and slightly smaller in diameter than the cylinder. It is sewed on one side to a base piece fashioned from a piece of galvanized sheet metal and assembled as illustrated in the circle. Note that this base piece is bent up at the point marked "left connected here," and then soldered along the edges to form a cup to fit over cylinder bottom.

Screen Protects Valves

A piece of copper screening should be soldered to the outside of the valve base, covering the hole, so as to strain out objects which might injure the valves. Then solder all seams well and make them water tight.

The base is provided with a bumper in the form of a U-shaped strip that is clamped about the base piece.

The moving valve is merely an auto pump leather valve converted. The auto pump plunger rod, however, is probably too short, so a new one will have to be made. Its length can easily be computed. The moving valve should clear the bottom valve by ¾ in. and 1¼ in. should be left at the other end of the handle.

A hole, exactly 5/16 in. in diameter, is drilled through the center of the pipe cap at the top of the pump. This cap serves as a packing box to keep the water from squirting out.

Benzine Cleans Tracing Paper

YOU can turn out a much neater tracing job if you will give the cloth a good cleaning before quitting it. This may be done by going over the cloth with benzine, applied with a wad of cotton. The benzine takes off the lead pencil marks and other unsightly blotches, but does not attack the ink. Finally rub treated places with talcum.

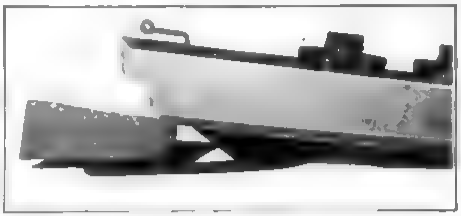
Ink Bottle Cap Keeps Pen Clean

HERE is a practical pen holder that keeps the pen always clean and bright and costs nothing. The holder is merely the composition top that covers the cork of ink bottles. In this a quarter-inch hole is drilled for the insertion of the pen point as illustrated in accompanying photo. Never necessary to clean pen.

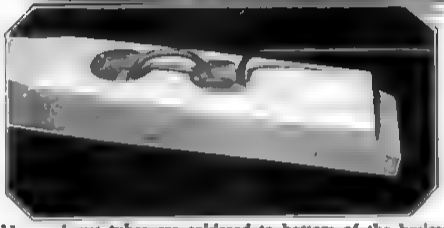
Insert pen in hole in top to keep point clean and bright.

Dry Ice Is Power Plant of Midget Speedboat

Carbon dioxide propels toy craft on fast long-range cruise



Rudder, made from length of No. 12 hard wire, to which is soldered a strip of copper or tin, is attached to the stern in position seen here. Note that exhaust tube which emits the carbon dioxide gas projects well out behind the stern. The rudder can be set so the boat will take a circular cruise of the lake. Boilers project up half inch or so beyond deck.



How exhaust tubes are soldered to bottom of the boilers. Note extra bar connecting cans to hold them firmly seated

SPOUTING a stream of carbon dioxide from the dry ice in its boilers, this little speed boat will tear through the water like its big brothers on an open water race course.

The fuel can be procured at almost any drug store, and construction involves only a negligible outlay of cash and elbow grease.

Approximate shape of the body is seen in the accompanying photographs. Let your hull designing conscience be your guide on this job. Balsa wood is best hull material.

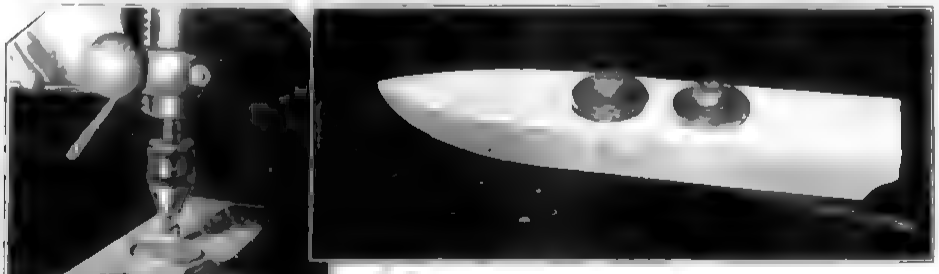
The boilers consist simply of two small cans with screw-on tops. The cylinders are seated in the body of the hull after a hole of suitable size is cut with the tool illustrated below. Lower section of the hole should be of smaller diameter than the upper part for proper seating of the can.

Note that the two boilers are connected on the bottom with copper tubing, about ¼ in. in diameter, soldered firmly to prevent leaks. The exhaust, through which the carbon dioxide spouts to give the boat its push, taps (soldered) off the rear can, and passes back under the hull of the ship.

The end of the exhaust tube should be flattened. A little experimentation will show the proper degree for highest speed.

Finally attach the rudder, which is made up from a piece of No. 12 hard wire, with a strip of copper soldered on the bottom.

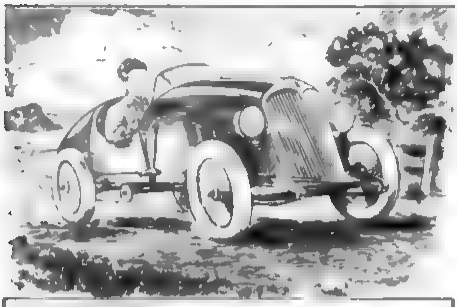
Your boat completed, you're ready to fuel it for a speedy cruise across the lake. Unscrew the tops of the boilers and drop in each a hunk of dry ice. Clap on the tops, and set the boat down in the water. Gas will begin to issue from exhaust and as the boilers get up steam, boat will get up speed.



Swing bit cuts holes in the balsa wood hull to seat the boilers. This tool is made by bending small steel rod and sharpening and flattening the end, then securing it in chuck of power drill.

Here is the completed speedboat ready for launching. Hunks of dry ice are dropped in the screw-tops of the can boilers, the gas passing out the exhaust tube to drive the boat forward. Balsa wood is preferable for hull material, though any other light wood will suffice. In designing the hull you can utilize any conventional plans, taking care here to keep the center of gravity well abaft the beam. Highest speed is attained by proper flattening of the end of exhaust tube, which may be determined by experiment. The double boiler arrangement increases range and speed.

Use Your Old MOTORCYCLE



by E. D. HILBURN

Sweep the cobwebs off that old motorcycle engine and put it to use. A car, a boat or an airplane can be powered with this type engine if the conversion is done as outlined here for amateurs.

MOTORCYCLE engines of from 7 h.p. in the single cylinder size to as high as 20-25 h.p. in the V-twin type can be converted into power plants for other uses if the simple precautions advised in this article are followed.

Characteristics

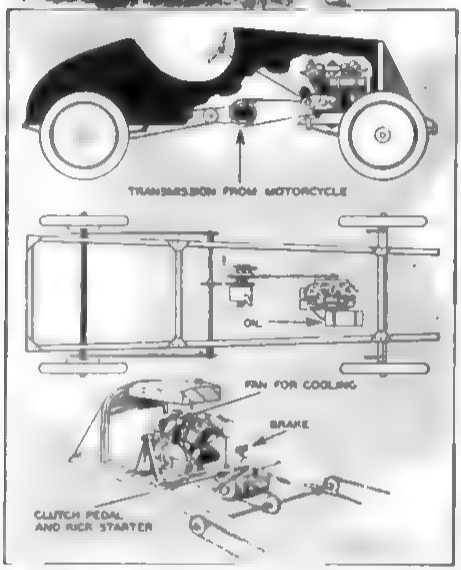
Let us consider the air-cooled single or V-twin motorcycle engine. Here is a gas engine of high compression, with large flywheels (as far as weight and inertia go) in the base. The high compression means high power output per cubic inch displacement. It also means lots of heat in the cylinder. The flywheel weight makes for even torque at slow, lugging speeds.

Usually, and in practically all engines made in the last ten years, the oiling system is forced feed, dry sump. This means that a separate oil reservoir is used to supply oil under slight pressure to all parts of the motor.

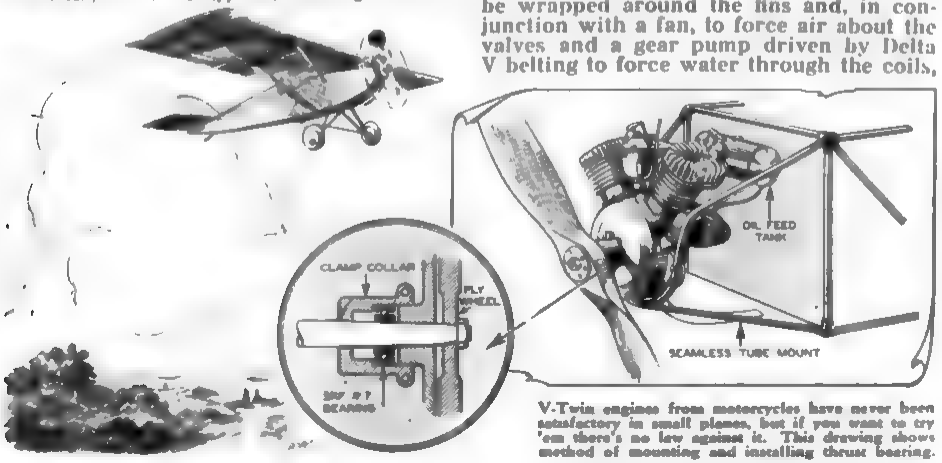
In its essentials the motorcycle engine is a high duty, rugged job, which, if the bearings are good, will serve fairly well in a boat, midget car, in an airplane or as a stationary engine.

Marine Precautions

In a boat, the things that must be accounted for in conversion are cooling, thrust bearing, and adequate flywheel. The sketch shows how copper tubing may be wrapped around the fins and, in conjunction with a fan, to force air about the valves and a gear pump driven by Delta V belting to force water through the coils,



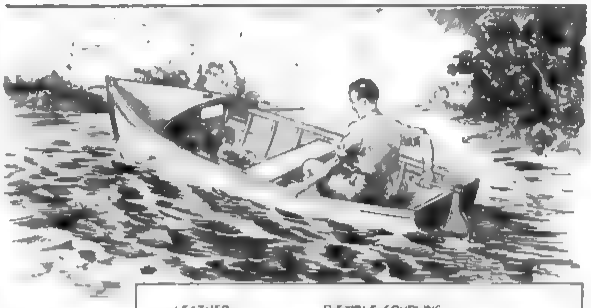
Midget cars are ideal objects for attack when planning to put an old motorcycle engine into use. This drawing schematically shows the approved mounting of clutch.



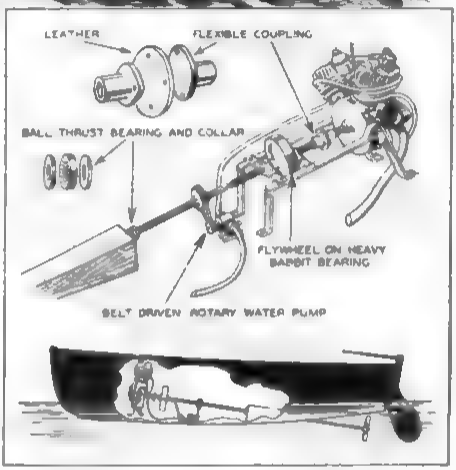
V-Twin engines from motorcycles have never been satisfactory in small planes, but if you want to try 'em there's no law against it. This drawing shows method of mounting and installing thrust bearing.

ENGINE in a Car, Boat or Plane

be made into a good boat engine. For best service the propeller selected should be one that will hold the motor down to about 1,000-1,500 r.p.m. This will insure the bearings being not overworked, and will help keep the engine cool, thus saving the usual burning of cylinder oil against the walls resulting in eventual carbonization and seizing, with scored walls the penalty.



There should be a Model T universal joint with a flange leather coupling connection to the motor through the flywheel as shown. A small cast iron flywheel for starting and additional flywheel effect, sectioned as the drawing shows, will do the trick. The drawing for the main part shows how I would rig up such a conversion.



Thrust bearing, pump, flywheel and coupling, with cooling coils will make a conversion with plenty of kick to it.

Welded Waterjacket a Possibility

If you are real good with a welding or brazing torch, possibly you could braze a water jacket on in place of the fins.

The drawing shows how the strap iron mounts are worked out. The thrust bearing is the usual ball and collar type. It is necessary to use these. They can be had in the one-inch shaft size from the Grand Rapids Propeller Co., Grand Rapids, Mich.

A small portion of the water from the cooling stream should be diverted into the exhaust. This will be found to be a fine muffler and no other silencer will be needed.

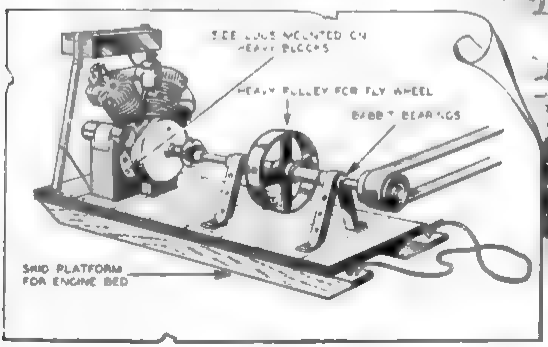
The gear type pump, either a Lobee or some other good make, can be had from E. J. Willis & Co., 85 Chambers St., New York City. Just tell 'em Westy Farmer tolja so and they'll do the rest.

Such power plants will weigh about 85-100 pounds and will drive the average outboard type hull weighing 150 pounds about 15-25 miles an hour.

In the Small Car

The motorcycle engine for car use is ideal for small stuff. All you have to do is

(Continued on page 135)



A good little saw rig can be made out of motorcycle engines by using this general idea in converting for stationary use.

Save Fifteen Per Cent on Home You Build

Extremely economical is home No. 3-S-2, built in either solid masonry or frame, depending on your tastes. Solid bricks painted or stuccoed also prove highly popular.

For complete blueprints of house illustrated on this page send $1.00 to Modern Mechanix Home Building Editors, 529 S. 7th Street, Minneapolis, Minn. Two new plan books, "Homes for Newlyweds," containing 32 of latest ideas for low cost homes in all styles, and "16 Selected Homes for Lean Purses," containing time, space and labor saving bungalows, may be had for 15c each, or both for 25c, from MM Home Building Editors.

by **MAURICE I. FLAGG**

IT MAY cost as much as 15 per cent of your total building expense to put a cellar under your house. That's a lot of money.

Is a cellar worth that much in a little house? Take a $5000 house for example. By omitting the basement you can save perhaps $600. By installing a closet bed you can save as much as another $600 according to manufacturers.

There's $1200 to start with. It's worth while thinking about and planning for, especially if like many you are trying to get by on the smallest cash outlay possible.

First floor heaters give satisfactory results. By insulating floors, sidewalls and ceiling you should be comfortable in the coldest weather.

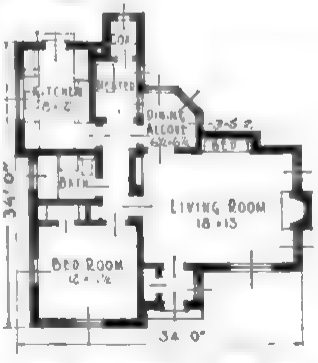
In this house, Plan 3-S-2, you have what amounts to apartment efficiency but in a detached small dwelling. While the house has been planned without a cellar you may have one if you wish. Stairs to the basement will descend where the heater room is now located.

While there is only one bedroom the closet in the living room may contain a roller type or wall bed. A dining alcove practically all glass replaces the formal dining room. The kitchen is planned to save steps and labor. The living room is the now popular studio type.

The house may be built either of solid masonry or frame, depending upon your tastes. It may be solid brick painted or stuccoed as shown and trimmed with face brick. Or it may be stucco on hollow tile.

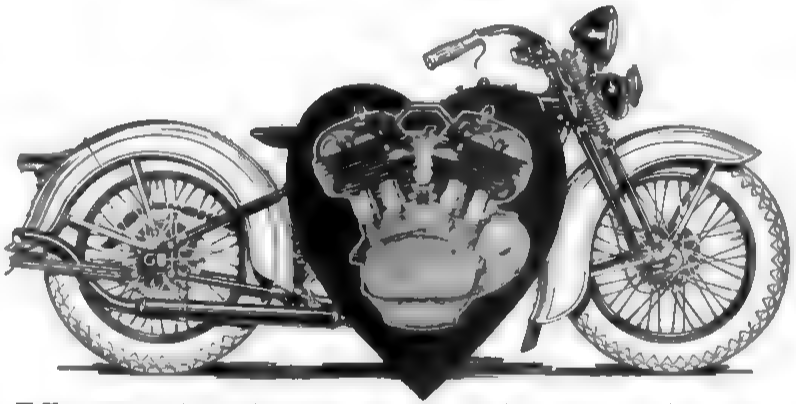
The cost to build will depend upon the materials used. And should range between $3500 and $5500 according to location and equipment. It's a fine plan, highly efficient, and everything has been provided to save every last dollar possible. Space saving apartments are the rage now. Huge barn-like residences are passe. The depression showed us that we could live just as comfortably in a small, compact home.

Above—Breakfast nook replaces the formal dining room, effecting a considerable saving in building costs as well as in expenditure of housewife energy. Floor plans may be seen in the drawing at the right. While there is only one bedroom, the closet in the living room may contain a roller type or wall bed. The living room is of the studio type.



Jim Corbett had a FIGHTING HEART

So has the New HARLEY-DAVIDSON



HERE'S punch, speed, stamina — in a motorcycle motor — to a degree never approached before. Thirty-six horsepower — 4600 R. P. M.! Think what that means in flashing speed and lightning getaway.

Like "Gentleman Jim" Corbett, this great TNT motor doesn't know the meaning of "quit." No matter how hard the going, its never-say-die power keeps punching away. A true FIGHTING HEART—like all CHAMPIONS have!

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HOBBY DEPARTMENT

Coin in Commemoration of Christ

GREAT historical and religious interest attaches to an ancient coin now in the possession of MODERN MECHANIX AND INVENTIONS Hobby Department devotee living in Canada. Struck off in commemoration of our Lord, the coin dates back approximately 1900 years, apparently being coined when the Christ was still alive.

The obverse and the reverse of the coin are shown below. On one side is seen our Lord seated on a bench in a garden, while on the other is inscribed the words "Basile Basila," meaning the King of Kings. The figure and letters have been almost completely erased by time, but enough is left to identify the coin as authentic.

Above is seen our Lord seated on bench in garden, while on the reverse side are inscribed the words, "Basile Basila" meaning King of Kings.

Dutch Indies Stamp Can Be Erased

A HOBBY department correspondent in Batavia, Java, sends in a stamp which will interest MODERN MECHANIX AND INVENTIONS collectors. Shown below, it bears the picture of the famous Dutch hero, Willem de Zwyger (William the Silent), and was issued by the Netherlands Indian Government in commemoration of the 400th birthday of the Hollander.

Stamp issued by Dutch Indian Gov't in honor of William the Silent.

There is an interesting little joke about this stamp—it can easily be erased, despite the fact that William was famous for his heroic exploits at sea. Just why the Dutch government introduced this little innovation is not made known, but it lends uniqueness to the stamp.

Though the stamp has been available only since the 19th of April, it has won wide favor among collectors.

Some Points on Air Mail Stamps

AEROPHILATELY, once merely a subordinate interest of collectors, has grown now to huge proportions, so large that it has an independent status with its own catalogues, societies and dealers.

Collectors of air mail stamps are chiefly interested in mint stamps and flown covers. (Covers are postcards and envelopes.) A cover which is backstamped has a higher value than one which has nothing but the dispatch postmark. Often the stamp is the only proof that card or envelope has been flown. Thus covers should be left intact.

Often it is impossible to secure backstamped covers of certain flights. For this reason, the collector, when proffered unbackstamped covers, must use his own judgment in deciding about purchase.

ADLETS FOR HOBBYISTS

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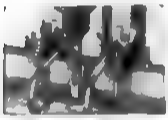
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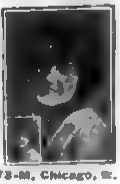

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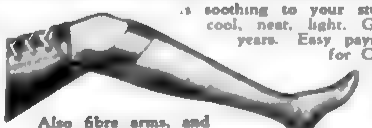

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How to Build a Short Wave Adapter

(Continued from page 101)

As tube base plug-in coils are used the one socket must be for receiving them and the other for the tube. Four coils are made according to the data given elsewhere.

The leads emanating from the adapter go to a tube socket which in turn is plugged into the detector socket of the receiver. When the adapter is ready for use plug in and connect the receiver antenna to the antenna post on the adapter.

Signals are tuned in on the adapter controls and the receiver controls are "dead" except for the volume control.

Turn the knob on the 23 plate throttle condenser until a "plop" is heard. Stop turning and retard the control until the receiver is on the verge of "plopping" again. At this point the tuning control is turned until a heterodyne whistle is picked up or the actual music or voice.

After some practice with the adapter you will be able to clear up the whistle and get the voice or music just as clear as on your regular receiver.

The R.F.C. (radio freq. choke) shown is a home-made affair and consists of 350 turns of any fine wire (insulated, of course,) wound on a short wooden dowel about ⅜" in diameter. The grid leak and condenser are mounted between the two sockets and the leads are made as short as possible. May I caution you to cut down the length of the wires connecting this to the correct prong on the coil socket.

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29x4.75	20	2.25	1.15	33x4	8.25	
29x5.00	19	2.50	1.15	34x4	8.95	
30x5.00	20	2.50	1.15	35x4	9.25	
28x5.25	18	2.65	1.15	34x4½	9.95	
29x5.25	19	2.75	1.15	36x4½	10.25	
30x5.25	20	2.75	1.15	33x5	9.25	
31x5.25	21	2.95	1.15	34x5	9.95	
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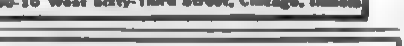

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Build a Microscope for Nature Study

(Continued from page 107)

Should it be found difficult to make the seams meet smoothly before soldering just wind a cord in one inch spirals around the tube while on the doweling, then spot solder between the turns. Then when the cord is removed follow the seam slowly with an iron, and a very neat joint will result.

Between the legs two inches from the base solder a stage-circular piece of the metal sheet 2½ inches in diameter with a ¾ inch hole in the center.

Into the lower end of the tube is snugly fitted an inner sleeve about one inch long. Into the lower end of this inner sleeve fit and solder a one inch high cone, the vertex of which will accommodate the object lens.

The end of the cone, however, should be cut off to fit the lenses. It would be advisable to make one of these sleeve and cone combinations for each lens to be used. The objective lenses may be cemented into place with collodion or clear lacquer.

The eye piece is fitted into an inner sleeve in the upper end of the tube and is composed of two lenses superimposed and of such a distance apart that an object close underneath cannot be brought into focus. The smaller shorter focal lens should be next to the eye. The distance separating the two lenses is made a little greater than the focal length of the eye lens in Huyghens' form.

A method of mounting the eyepiece lenses is to cut two circles of metal with holes in the center of each slightly smaller than the respective lenses. These circles should just fit into the eyepiece sleeve. Solder 3/16 inch from each end of the inner sleeve. Of course these two circles are placed and soldered after their proper distance has been determined, which is peculiar to the lenses available

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A Voltage Regulator for Generator

(Continued from page 111)

away. With the wheel fully loaded with as much load as you expect to supply in the way of lights, toasters, motors, etc., carefully adjust the spring nuts for 125 volts, watching the voltmeter needle as you go. Turn off say 10% of your load and see that the voltmeter needle comes back to 125 volts.

Now gradually cut out all of the resistance in the field rheostat and see that the voltmeter needle always promptly comes back to 125 volts. It will stay up around 130 or more if your spring is too tightly adjusted, meaning that it presses too hard on the carbon pile. If too loose, the voltage will drop below 125 volts.

Now turn off about 10% more load and the wheel will begin speeding up a bit and the voltage will take another rise, but if the regulator is working correctly the solenoid will be pulling harder on the plunger and the needle should again go back to 125.

If at any time the voltage suddenly goes up, be ready to give the field rheostat knob a quick turn backwards to cut in more resistance and save whatever you may have on the line from over voltage. Now throw all the previously disconnected load on again and see that the voltage will make a brief dip below normal and up again to normal. By this time you have made a few adjustments and have found out the use of the adjusting screw.

If the above tests were passed okay, throw off about half load and be ready with the rheostat knob if the voltage goes above 130. If the voltage stayed up, the spring adjustment is still too tight. Then try pulling the main switch for say two or three seconds and then throw it in again.

If that went okay, gradually throw off all the load and let the wheel speed up as fast as it can. The voltage should not go above 128 or 130 at most after the voltmeter needle has quieted down. While you have the main switch out again, connect all the load you have and get ready to throw it all on at once, seeing that the voltage comes back to 125 in a few seconds time.

By that time you will have the field rheostat at a point that will tell you whether or not your carbon pile is right. If you must have the field rheostat cut in with some resistance, your carbon pile is either too short or your spring adjustment is still too tight. If you can dispense entirely with the field rheostat on the runaway test, your carbon pile is too long or your spring adjustment is too loose.

If the solenoid starts a jittery vibration that shows up on the voltmeter needle, heavier oil is needed or the joint of the piston rod at the crossbar is loose. That should be tight at all times.

If despite all you can loosen the spring, the voltage stays up, especially with full load thrown off and the wheel going full tilt, the series field coil will have to be shunted across its terminals with a piece of resistance wire of suitable carrying capacity. Watch the temperature of that wire when all load is off and the wheel is running away. It should never get above blood heat. A little trial will determine the right size wire. Too heavy a shunt makes low voltage.

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Midget Generator Lights Workshop

(Continued from page 117)

that will result in the next cut being taken exactly 90 degrees away from the first thread cut. You can readily see that if the carriage is moved the amount of the lead, or 2 inches, the tool will start going through the same cut as before.

After cutting the helix, turn off stock to make the thrust face (see Fig. 1) and form the body of the shaft. Turn a tit on the propeller end of the shaft so the water enters same without disturbance.

The shaft being finished, next make the gate. This is a helix just the same as for the runner helix, BUT OF OPPOSITE HAND, so it is a left hand thread. You will need another lathe tool to cut this thread, with the bevel on the opposite side, also the same clearance but on the opposite side. The other dimensions will be the same, as the lead and pitch is the same as on the runner helix Turn a tit on the gate entrance also.

Now the gate must be a firm, non-moveable fit in the nipple, so when boring out the nipple for the gate, remember to bore the nipple the same size as you turn the gate helix, and then heat the nipple to get the gate helix inside in place. When cold, the nipple will have shrunk a firm fit on the gate.

The nipple should have a seat for the gate to rest against while the pipe is warm, so the gate will not fall beyond its proper place. Placing the nipple in boiling water should expand the diameter enough to get the gate inside on its seat.

The 1x3-inch nipple must be bored out large enough on the runner end so the runner can rotate without rubbing on the pipe surfaces, a running clearance of about 10/1000 inch radially being enough. Now screw the nipple into the tee, using white or redlead on the joint and being careful not to distort the nipple with severe use of the pipewrench. Screw the brass pipe plug into the tee (not yet drilled) by holding the tee in a bench vise, then chuck the tee on the pipe plug end in the lathe, and center it very carefully by the bore of the nipple.

When you are sure the centering is good drill through the pipe plug with a long drill, going through both nipple and tee, 5/16" diameter. If correctly ground, the drill will cut about 5/1000 inch large, which just gives the shaft ample running clearance.

Matchmark the plug and tee with a chisel p nt cut after taking the tee out of the lathe chuck, so after the pipe plug is finished with its bushing, you will know how far to screw up the plug again.

Now make the bushing for the pipe plug and drill four 1/32 inch holes diagonally through the face. This is to provide water lubrication to these parts.

Drill an eighth-inch drain hole in the square part of the pipe plug as shown. According to the care you have used in drilling and assembling the pipe plug and its bushing, more or less water may tend to come out on the outside shaft end. If it seems excessive, solder a ¼-inch inside copper pipe to the drain hole side, and run the

(Continued on page 132)

How to Build Lark, Jr., a Boys' Boat

(Continued from page 97)

with a brass screw at each frame until the transom is reached. Bend the chines at the same time so that they will not have a tendency to spring your set-up.

The plank next the chine is ¾" cedar. All the rest of the topside strakes are ½" cedar. These go on one at a time, side for side, until you have planked the sheer strake. The planks are fastened to the stem and transom and frames with brass screws, and are copper rivet fastened with ⅛" copper rivets over burrs, which can be procured at any local hardware store on order.

After the sides are planked, the bottom is put on. These planks are ½" white cedar, too. They should have fair, flush edges and about a sixteenth of an inch outgage. This outgage will allow you to caulk, or to run in a bead of Jeffery's marine glue from an oil can spout.

Keel is Put On

The oak keel is next molded and fastened in. The boat will then look like Johnny's drawing on page 96. You are ready for putting in the interior and exterior trim when the inside of the boat has had at least two coats of priming lead paint, either red, gray or green.

The next step after the hull is completed is to put in that seat that runs along the cabin back. This seat is about 12" wide and is set and fastened to the first plank overlap down.

Next put the front deck beams in place with the right arc for the deck curvature.

After this plank over the stern deck with the same thickness boards as on the foredeck. Run the boards from side to side forward about seven inches. Next plank the side deck or covering board which is one board put on wide and planed off to the shape of the hull.

Now cut to the right shape the cabin front, or headledge as shipwrights call it, and screw to the deck beam.

Cut out the window ports in the cabin sides, and screw it first to the front and then back along the covering board.

Now comes the cockpit.

The cockpit floor runs along the bottom overlap or board, which, unlike the three upper topside planks, is ¾" thick.

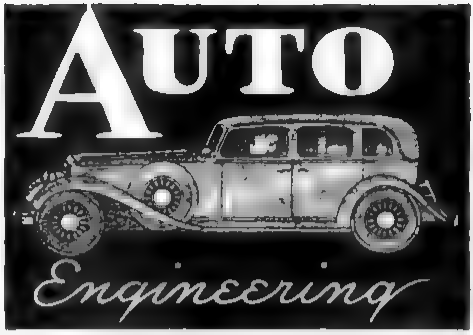
Run the floor up under the seat which runs across the boat, leaving, if desired, a hatch in the middle.

The cabin back is formed by running boards up from the back seat. Plank the roof of the cabin leaving opening to starboard of half the width of the cabin. This will accommodate the sliding hatch.

Canvas the decks and cabin top and paint green with a white hull to form the best color scheme. Green is best for under water, too.

Put a varnished molding along the top of the sheer strake on both sides.

The motor can be mounted on a well reinforced platform securely fastened to the transom. This worked well for Bosley and is used by some outboard racers. A rope from the motor to the boat will overcome the fear of motor loss. The boat should make about six miles with a three or four-horse engine.



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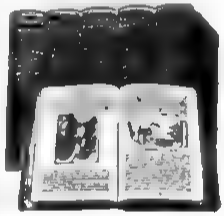

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Fortunes Waiting for Inventors

(Continued from page 99)

housewives of America would snap these things up by the millions.

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Midget Generator Lights Workshop

(Continued from page 130)

pipe into the side of the 1x5-inch nipple, soldering the joint tight.

Now solder on the circular brass base plate, as shown in Fig. 2, and arrange your pipe connections to receive and take away the water. Without load, under the full house pressure usually found this little turbine will make about 12,000 r.p.m. if well made. With the load, the r.p.m. can be varied within a wide range, both by putting on more load or throttling with a gate valve. Ordinary globe valves lose too much pressure.

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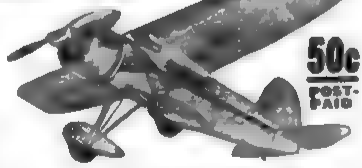

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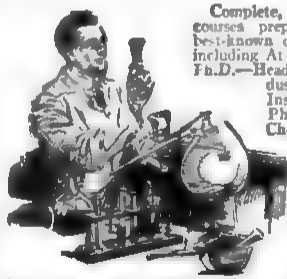

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Where Television Stands Today

(Continued from page 86)

and prevents the mirrors, which pick up sight, from vibrating. As these mirrored cells interpret light only, any disturbance of them would register as a disturbance in light at the receiving end.

The matter of synchronization has been eliminated by a secondary wave which is very low in periodicity, and which adjusts the speed of the motor just as a power surge synchronizes an electric clock to keep it rolling away in accurate time.

We can say, therefore, that television is today right where radio broadcasting was when the vacuum tube was introduced. The outstanding development of the last year placing television in this category is the crater type lamp, and the accompanying elimination of most synchronization problems, and the new knowledge of how to keep sound from interfering with the sight channels, together with the "averaging out" principle of the Senabria 3 spiral disc.

This is enabling manufacturers to build receiving machines which give satisfactory operation and which require little skill in operating. That means, friends, that television is now ready to come to the home!

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Use Your Old Motorcycle Engine

(Continued from page 121)

to provide the oil and gas tank, and mount the motor so it will cool with a fan or other device for feeding air to the fins. Bowden control wires can be led to spark and throttle and the sprocket chained to either a cone type clutch from a junked auto, or to a regular motorcycle clutch. There is such a wide diversity of need on this matter of clutches and differentials, for small cars are properly a subject in themselves, and any prescription must be made with an eye to individual cases.

For the Light Plane

Frankly speaking, airplanes have never been satisfactorily flown with motorcycle engines of the single or twin type. But there is nothing to prevent you from trying it and proving it to yourself. Chief reason for the trouble is that most engines such as this are badly over rated. Second reason is that air screws are seldom more than 60% efficient and even if a motor did have all the power the makers claim, he'd only be getting 60% at the propeller end of things. Running wide open as these engines must if they are to get ships off the ground, they soon heat up and seize. I have seen three ships which would get off the ground with this type of engine (not the 4-cylinder kind, remember. They are generally like) but each time the motor froze in the air.

The only thing required is the addition of a thrust bearing. The motor can be mounted any way you want to mount it, as long as it is rigid and securely fastened the proper weight-distance from the nose of the ship. Usually steel tube about ¾ 20 gauge is bent, drilled for fitting and serves to hold the motor in place.

The drawing shows how the thrust bearing is constructed. Just a simple collar with a special tapered shaft turned out to hold the prop boss.

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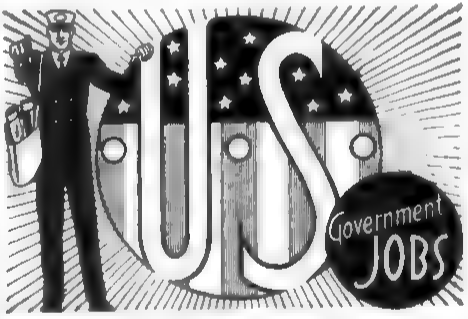

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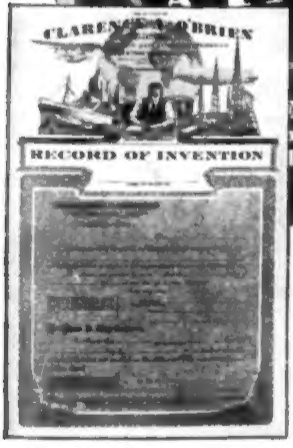

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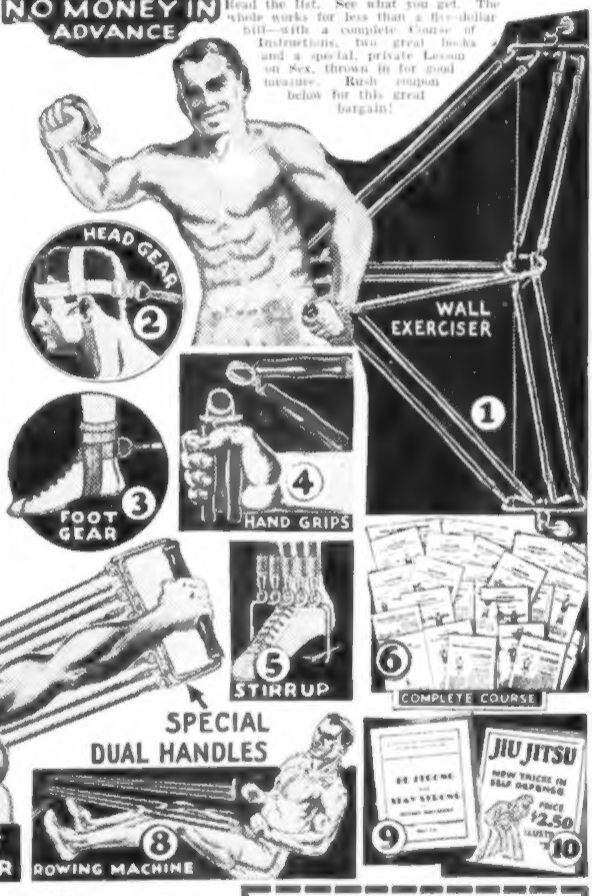

RUSH COUPON for Sensational BARGAIN!

No money needed. Just write name and address in coupon AT ONCE. Pay Postman only $4.95 plus actual postage on delivery. (Or send $4.95 and I pay postage.) Simply return outfit immediately if not wanted. Money-back guarantee. Rush coupon. This offer may never be repeated.

MICHAEL McFADDEN
Dept. W-10
55 East 11th St. New York, N. Y.

Michael McFadden, Dept. W-10,
55 East 11th Street, New York, N. Y.

Dear Mike: Shoot me the works C. O. D. I'll pay $4.95 plus actual postage. My money back if I am not satisfied and return outfit immediately. (NOTE: If you prefer, enclose $4.95 and I pay postage. Same Money Back Guarantee.)

Name .....

Address .....

Town ..... State .....

Outside U. S. A. Send Cash With Order

A NEW LIFETIME BUSINESS

OPENED TO EARNEST MEN

NO HIGH PRESSURE SELLING
NO HOUSE-TO-HOUSE CANVASSING

INCOME EQUAL TO REQUIREMENTS OF THE HIGH-GRADE BUSINESS MAN

E. Lawson, of Tennessee, clears $108 profit his first 3 days in this business. He tops off these earnings with $113 profit on a single deal a few days later. J. C. May, Conn., cleared $262.35 the first nine days he worked. J. E. Loomis, Oregon, earns $245 his first 9 days. A. W. Farnsworth, Utah, nets $64.16 his first day, a Saturday. S. Clair, New York, writes he is clearing as high as $70 a day. W. F. Main, Iowa, cleans up $291.50 in 9 days. R. Y. Beeton, Kansas, starts out with $530.53 net for 40 days' work! These men are beginners. How could they enter a field totally new to them and earn such remarkable sums in these desperate times? **Read the answer in this announcement.** Read about a new business that does away with the need for high pressure selling. A rich field that is creating new money-making frontiers for wide-awake men. **Those who enter now will pioneer—to them will go the choicest opportunities.**

FOUR $15 SALES DAILY PAY $280 WEEKLY

INSTALLING NEW BUSINESS SPECIALTY ON FREE TRIAL—MAKING TREMENDOUS CASH SAVINGS IN OPERATING COSTS FOR THOUSANDS OF CONCERNS THROUGHOUT THE U. S. AND CANADA

$4,707 Savings For One Kansas Store in Two Months

Sunday Richards of Kansas reports $68.00 and saves $4,707.00 monthly. Arch Hoffman, Iowa, reports $200. Roger Lunsford, Fort Cobb, West Virginia, records $85, reports selling over $1,000.00! Fay Bergeron, Colo., West Virginia, reports $85, reports selling over $1,000.00! Fay Bergeron, Colo., reports $85, saves $1,500 yearly. Auto Tech Company, New York, records $15, saves $600.45! With these and scores of similar results to display, our representatives interest every business man, from the very smallest to the very largest. No one, no matter the size of his business, can read these facts without wanting to know more.

NO HIGH PRESSURE—SIMPLY INSTALL—SELLS ITSELF

Here is a business offering an exception so successful that we make it a standing offer. Our representatives [illegible] install the specialty without a dollar down. It starts working [illegible] The customer sees with his own eyes a big, immediate profit on his proposed investment. [illegible] ONE OUT OF EVERY 12 BUSINESS MEN REPRESENTATIVES [illegible] NEARLY 50% IS HIS OWN PROFIT. THE SMALLEST HE MAKES [illegible] INSTALLATION. [illegible] They are getting the business [illegible] selling to another business. You can get exclusive rights. Business is GOOD, in this line, in small towns or big cities alike! It's on the boom now. Get in while the business is young.

F. E. ARMSTRONG, Pres., Dept. 1019-K, Mobile, Alabama

COMPLETE TRAINING FURNISHED

Every man with no help started at scratch, without previous experience, many coming out of clerking jobs, many out of small businesses, some out of large concerns. We teach you every angle of the business. We hand you the biggest money-making business of its kind in the country. You try out this business ABSOLUTELY WITHOUT RISKING A RED COPPER CENT OF YOUR OWN. Can't possibly tell you all in the limited space available here. Mail the coupon now for full information, nothing to risk, everything to gain.

Brilliant Record of Success

America's foremost concerns are among our customers. [illegible] Standard Automatic Co., United States Petroleum Corp., [illegible] Mullins Co., National Paper Co., International Coal, General Service, National Radio [illegible] scores of other nationally known firms. Thousands of small business enterprises, professional men, such as schools, hospitals, laboratories, stores, theatres, [illegible] establishments and department stores.

Customer Guaranteed Cash Profit

Exclusive sales [illegible] guaranteed cash profit on [illegible] sold. You [illegible] business [illegible] Protected by [illegible] surety bonded national organization.

Portfolio of References from America's Leading Concerns

[illegible] A handsome portfolio [illegible] Dollar [illegible] of testimonials [illegible] You [illegible] Closes [illegible] Shows [illegible] Tells [illegible] Sells [illegible] Investigate [illegible] Closes [illegible] Rush the Coupon for Full Information—Territories Filled in Order of Application

If you are looking for a real business [illegible] opportunity to get in touch with us at once. Let the [illegible] before [illegible] Territories [illegible] Send the coupon [illegible] Use the coupon for convenience. It will bring you full information and our proposition immediately.

MAIL FOR FULL INFORMATION

F. E. ARMSTRONG, Pres., Dept. 1019-K, Mobile, Ala.

Without obligation to me, send me full information and your proposition.

Name .....

Street & No. .....

R.F.D. .....

City .....

State .....